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POPULATION ON TWIN CITY LINES

A table in the annual report of the Twin City Rapid Transit Company of Minneapolis, Minn., for the fiscal year ended Dec. 31, 1911, gives figures from which some interesting deductions may be made upon the increase in density of traffic. It shows for each year from 1878 to 1911 inclusive the population served, the earnings and the total number of revenue passengers. In our calculations we have taken only the figures for 1878, the earliest year given, and for the decade years in which the United States census was taken. In the first year named the gross revenues amounted to $1.04 per capita; in 1880 they were $1.26; in 1890 the average was $4.65; ten years later it was $7.42, while in 1910 the average was $13.55. The number of revenue rides per capita shows, of course, a corresponding increase. In 1878 it was 20.8 and in 1880 25.1; in the three ensuing decadal years the average number of revenue rides per capita was respectively 92.9, 148.3 and 267.2. The rate of fare has not been changed during the period and remains at 5 cents. The total population served is stated as of 1910 at 550,000, and it is with the communities aggregating this number of people that the company developed its gross earnings from passenger traffic of $7,452,843 during that year. This amount is at the rate of $19,625 per average mile of single track operated in 1910.

THE WILMINGTON FARE CASE

The conclusions of Judge Bradford of the United States Circuit Court in the Wilmington fare case, published elsewhere in this issue, are worthy of careful consideration. They portray clearly the culpable action of the Wilmington Public Utility Commission in ordering the Wilmington system to restore an abandoned ticket rate of fare before making any real investigation of the facts in the case. We do not know what specific authority is given to the commission which exercises jurisdiction in the city of Wilmington, but the action that was taken illustrates a kind of procedure that will surely weaken the moral standing of a regulative body in the community even if it does not attract attention so forcibly to abuse of power that a change in the statute results. The object of rigorous commission laws should be to give public authorities the right to regulate, provided that they do so with due regard to the property rights involved and the reasonable requirements of the public. Mere arbitrary rulings will not generally be upheld by the courts to which they certainly should be appealed. Such rulings as this should be nullified by courts of independent judgment, for they will foster a sentiment that will tend to prevent the development of that spirit of co-operation between corporations and commissions representing the public which must prevail if the best results are to be secured.

FORMATION OF COMPANY SECTIONS

The first company section organized in connection with the American Electric Railway Association, by officials and employees of The Milwaukee Electric Railway & Light Company, should attain results which the association working by itself would find it almost impossible to

accomplish. The association, by reason of its national character, finds it impracticable to hold more than one convention a year, supplemented by a midyear conference, which at best can be attended by a number of officials that is small in comparison with the attendance at the annual gathering. After the completion of a year's work and its presentation at the annual October convention, the meetings for another twelvemonth are confined very largely to the gatherings of committees. Although the meetings of committees are one of the most efficient means of promoting the objects for which the association exists, they are necessarily restricted, both in point of attendance and in frequency of occurrence. Furthermore, they are attended largely by those who have made a special study of some particular subject on which the association desires investigation, and their principal educational value is therefore realized only at the end of the year when the deliberations and conclusions are completed. A company section such as has now been started in Milwaukee meets not only the need of frequent gatherings but also the desire on the part of the younger men in the industry for active participation in the work of the association. Through the extended application of this idea, the association should help substantially in the development of younger men who are entering on their life work and should attract local attention to the electric railway problems and the means of their solution.

SAVING TIME IN THE SHOP

The location of the storeroom and car maintenance layout generally is guided by two considerations which are sometimes incompatible, namely, easiest loading and unloading means from delivery tracks combined with a position which is readily accessible to the most important shops. Where the convenient delivery of stock to the storeroom is considered the paramount object, the storeroom possibly may be placed so far away from some of the shops that an appreciable amount of useful labor time is lost by the men in going to and fro for their materials. Auxiliary storerooms minimize but do not eradicate these losses because allowance must still be made for extra space and attendants. On the other hand, while it is more convenient for the men from the overhauling shops to have the stockroom centrally located, the storekeeper would find it difficult to get along without the platform facilities and yard space which are customary when the storeroom is in an isolated building. The problem of locating the storeroom will be greatly simplified, however, if the present common practice is discontinued of having each man or his helper call for supplies. The experience of several large companies shows that if this part of the work is specialized the distribution of material can be carried out along much more economical lines. In the shops of the Oneida Railway at Syracuse, for instance, a traveling storekeeper is employed to pick up orders from men at work despite the condition that the storeroom is very near. The traveling storekeeper, however, is not obliged to carry bulky parts, because new fenders, gears, controllers and other heavy equipment are carried on an extra wide devil strip which was built between the heavy and light overhauling sections. In the Toronto Railway's main shops the pitmen do not have to interrupt their work as all supplies are delivered to them by messengers who are summoned by means of push buttons. The Virginia Railway & Power Company has gone even further by installing a telephone system to bring every department into immediate touch with the storeroom. A telephone installation is especially desirable when the shops are located in several buildings which cover a considerable area, or even when they are combined in one large building. Perhaps, the best feature common to all of the time-saving practices described is that they raise the output of a shop in a far less obtrusive way than the "speed-up" methods of the efficiency engineer.

THE RATE OF FARE IN COLUMBUS AND CLEVELAND

An editorial in the *Ohio State Journal*, of Columbus, Ohio, in discussing the pending probable changes in street railway fare in that city and in Cleveland, suggests a question as to the effect of the new rates on the traffic in each city. It says that the Cleveland Railway will have to raise its rates from the present 3-cent basis if the road is to be run; on the other hand, the Columbus Railway & Light Company is to reduce its street railway rate from seven to eight tickets for 25 cents.

As the conditions governing the rates of fare in these two cities are not alike, it is necessary to a clear understanding of the facts that they should be emphasized. In Cleveland the rate of fare is based in theory upon the cost of operation. That is to say, when the amount allotted for operating expenses under the ordinance or supplementarily by the City Council fails to meet these expenses and a deficit accumulates until the reserve or interest fund is reduced to a certain amount, the rate of fare is automatically advanced. If, therefore, we disregard the severe reduction in capitalization enforced by the city of Cleveland, we must admit that the intent of the ordinance is to base the rate of fare generally on the cost of operation.

Now, notice the difference in the clause regulating the rate of fare in the Columbus ordinance. In that city it is provided that the rate of fare shall be reduced to eight tickets for 25 cents when the gross annual railway earnings reach $1,750,000. So far as we are informed, there is no protective provision by which a reduction in the rate of fare may be governed by a proper consideration of the operating expenses. The reduced rate is based solely on the amount of the gross revenue. Whether the operating expenses are 50, 75 or 90 per cent of the gross earnings, the rate of fare is unaffected.

Neither an advance in wages nor an increase in cost of materials relieves a company from an obligation based, as this is, on developing gross earnings. Although an increase in gross earnings may result almost entirely from long-haul business yielding no direct profit, the company is forced to ignore that consideration and to meet the rate of fare stipulated. It is idle to wonder why such an ordinance was accepted. The fact that the company is operating under it indicates that it was the best bargain it could make at the time to protect a capital investment.

If we follow the poor logic underlying an ordinance of this nature a little further, we reach the vanishing point very quickly. For instance, if gross earnings of, say,

$1,750,000 would justify a rate of virtually 3 cents, then with the same plan of deduction we would have to defend an argument that gross earnings of $2,000,000 would justify a rate of, say, 2½ cents. From that it would be but a step to gross earnings of, say, $2,500,000 with a rate of fare of 2 cents. By the same form of unwise reasoning, as gross earnings increased further the rate would undergo periodical reduction until in the end the only question remaining would be the determination of a sufficient fraction above nothing to meet the scaling provisions of an adroit ordinance of this character.

To return to the question of the influence of the rate of fare on volume of traffic, it may be said, first, that low fares generally stimulate some extra traffic; second, that high fares generally discourage some extra traffic. People will ride more freely when the fares are low. But the traffic stimulated by low fares may be undesirable because it may develop at rush-hour periods and cost so much to handle that the expected margin of profit disappears in loss. Furthermore, the street railway cannot, as is often possible for the steam railroad, restrict reduced fares to out-of-the-season travel. Its rate for one is the rate for all. The regular patrons supply the bulk of the traffic, and if a reduced rate applies to them as well as to the extra riders who are induced to travel solely because of the economical opportunity offered, the average revenue per passenger dwindles materially. The ability of the company to provide proper service and to maintain its property is therefore curtailed in corresponding measure.

THE CAMBRIDGE SUBWAY

A notable addition has been made to the rapid transit facilities of the Boston Elevated Railway Company by the opening on March 23 of the Cambridge Main Street subway, connecting Harvard Square with Park Street, Boston. The subway is a double-track line about 3⅙ miles in length, and at a total cost, including all equipment, of almost $12,000,000 it has been built in practically a year less than the time allowed by law. The Boston Transit Commission, following the usual practice within the municipality of Boston proper, built the portion of the line east of the Charles River, while the railway company designed and constructed by contract the Cambridge section. Electric power was employed to an extraordinary extent in the construction work, and beyond the diversion of surface cars from portions of the main thoroughfares of Cambridge at certain periods, the task was accomplished so quietly and efficiently that the public as a whole saw little evidence of the undertaking until its completion.

The architectural and engineering features of the subway, which will be described in a later issue, are entirely in accord with the best modern practice, and are arranged to insure the highest safety of operation, economical handling of traffic and a speed of transportation considerably in advance of previous subway and elevated facilities in Boston. The most striking feature of the service is the establishment of a running time of 8 minutes between Park Street and Harvard Square, the former surface car schedules requiring 25 minutes under favorable conditions. Including two stops at Kendall and Central Squares respectively, the trip is now made at a schedule speed of nearly 24 m.p.h., the maximum speed attained by the multiple-unit trains used being about 40 m.p.h. This is the highest schedule speed made by any of the radial rapid transit lines of the company, and it is made possible by the small number of stops, the absence of sharp curves and severe grades, and the provision of ample power for the movement of rolling stock. The cars, as described in our issue of Jan. 13, represent a departure from previous types of rolling stock used in Boston, having three doors on each side, none more than 10 ft. from any passenger carried. The cars are nearly 70 ft. long, and it has been aptly said that the trains sweep the commodious station platforms free from passengers like a huge vacuum cleaner. By the construction of a long loop west of Harvard Square the subway trains will be enabled to handle an enormous football traffic at the Harvard Stadium, and mention should be made of the extensive transfer facilities afforded between the subway trains connecting and paralleling surface car routes, along the lines so liberally provided in the former elevated and tunnel service of the company.

The net result of the opening of the subway to the public may be expressed figuratively in the statement that Harvard Square and all of Cambridge to the east of that point practically have been transferred thereby to the heart of Boston. Access to the city from the great suburban area included in outer Cambridge, Belmont, Waverley, Arlington, Waltham, Watertown and even Newton proper is now only a question of reaching Harvard Square or Central Square. On account of the necessities of separating traffic streams flowing in opposite directions, the Harvard Square transfer station, through which numerous suburban surface lines are now looped, appears on the company's drawings to be one of the most intricate establishments ever built for underground railway service. But its actual operation is made extraordinarily easy and simple for the public by the use of short connecting ramps instead of stairways between the platforms most frequently used, the direction of travel being downward so far as possible along short lines clearly indicated by the use of signs. The benefit of the subway as articulated with the surface car service supplying the outlying communities has been powerfully felt from the opening day, and it is probable that a still larger traffic, including much that at present seeks the steam railroads, will be gained by the company as soon as the suburban service can be standardized on the basis of the highest possible schedule speed and fewest number of local stops consistent with the conditions. Until a definite period of experimentation has passed, it will be difficult, however, to determine just what amount of additional traffic beyond that immediately tributary to the Cambridge terminal will be developed by the new facilities.

On the financial side, the subway represents an investment equal to $1,400 for every dwelling house in Cambridge, and the mere interest on its cost demands the total revenue of 12,000,000 single fares yearly. Economies of some moment will doubtless accrue from the substitution of a few high-capacity trains for the relatively inefficient stream of surface cars formerly handling the traffic, but there is no question that the investment is a very heavy one to carry and that the company has done well to emphasize this aspect of the situation in its publicity matter.

New Steel Cars for the New York, Westchester & Boston Railway

These Cars Have Many Interesting Constructional and Equipment Features, Including Pressed-Steel, Unit-Side Frames to Carry Most of the Weight, Heat Insulation Means, Air-Operated Doors and Straight Single-Phase, Multiple-Unit Control

The New York, Westchester & Boston Railway is building a high-speed suburban line through the Bronx and Westchester County from a connection with the West Farms branch of the Interborough Rapid Transit Company's subway system at 180th Street in the Bronx to Mount Vernon, New Rochelle and White Plains. A connection is also being made at West Farms with the six-track Harlem River branch of the New York, New Haven & Hartford Railroad to permit trains to run over that line as far south as 129th Street to the terminal of the Second and Third Avenue Elevated Railroads. This new line will have four tracks as far north as Columbus Avenue, Mount Vernon, where it divides into two double-track lines, one turning east to New Rochelle and the other continuing north to White Plains. The entire line is built on private right-of-way without grade crossings and multiple-unit trains will be operated in local and express service at high speeds. Single-phase alternating current at 11,000 volts on the trolley wire will be used to propel the trains. It is expected that the line will be ready for operation between 180th Street and New Rochelle within a few weeks.

CAR EQUIPMENT

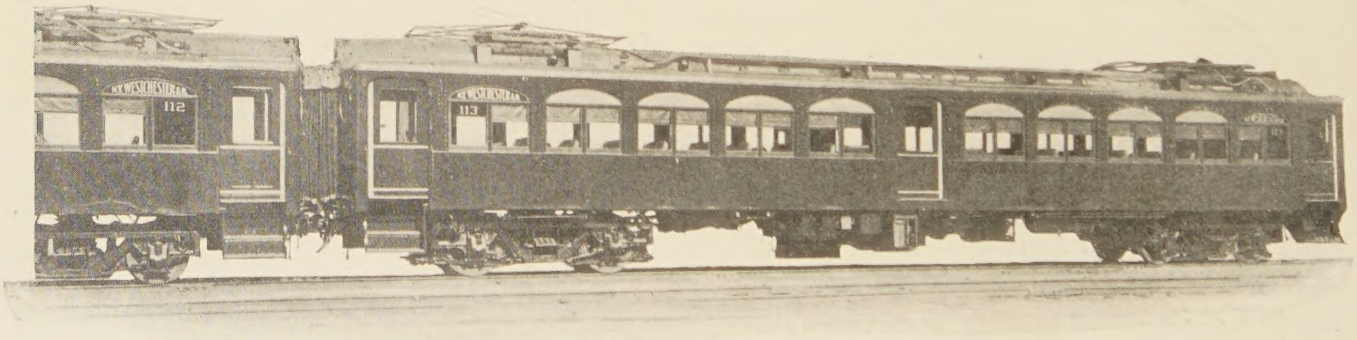
The initial car equipment of the road will consist of twenty-eight steel passenger coaches and two steel combination passenger and baggage cars. These cars were designed in the office of L. B. Stillwell, consulting electrical engineer for the New York, Westchester & Boston Railway, and have been built by the Pressed Steel Car Company, Pittsburgh, Pa.

The cars are built entirely of steel and have full vestibuled platforms and center side doors. The station platforms will be on a level with the car floors, but to provide for emergencies and also to permit the cars to be used on the Harlem River branch of the New Haven Railroad, which has low station platforms, a flight of three steps is attached under each end platform trap door. The coaches are 70 ft. 4 in. long over platform end sills, 9 ft. 7¾ in. wide over posts and 13 ft. 3½ in. high from rail to top of roof. There are thirty-five cross seats and four longitudinal seats flanking the center side doors, giving the cars a seating capacity for seventy-eight passengers. The two combination cars have the same general dimensions, but a compartment 16 ft. 5 in. long is set off at one end for baggage, and 4-ft. 3-in. sliding doors are fitted in each side of this compartment. The passenger compartment of the combination cars has seats for fifty-four passengers.

SIDE FRAME CONSTRUCTION

The side framing is of the pressed-steel unit, side frame construction which was illustrated in the Electric Railway Journal of Oct. 7, 1911, page 670. Each unit comprises a main post, 7 ft. 5 in. high, diagonal braces on each side at the bottom and one-half of a Gothic arch on each side at the top of the post, forming the letter board and side plate of the car. The units are pressed and flanged in one piece from ¼-in. steel plate. Twelve of these units are used on each side of the car, the spacing from center to center of the main posts being 5 ft. 5⅝ in. These pressed units when secured in place form a continuous truss of the height of the car side and combine great strength with moderate weight. The formation of the various members in one unit eliminates many riveted joints. The great strength and rigidity of this side frame construction permits the use of a comparatively light underframe as the center sills are kept in alignment by cross bearers at each main post 5 ft. 5⅝ in. apart.

Westchester Cars—Interior



Westchester Cars—Exterior View of Part of a Train

An interesting feature of this design is the unusual pro-

tection to passengers which is afforded by the strong side frame. The shock-resisting members practically inclose the entire passenger space. The usual construction, which is massive in the underframe, or at most as high as the window sills, offers less resistance to telescoping than the high side frame construction.

The roof is a compound arch type with fixed deck sash and exhaust ventilators.

CROSS BEARERS AND BOLSTERS

The cross bearers and bolsters are of the built-up type and are formed of pressed diaphragms and cover plates. The diaphragms are all perforated to remove unnecessary metal and to provide openings for air-brake pipes and control conduit. Suitable diagonal bracing has been provided to insure the rigidity of the underframe.

UNDERFRAME

The underframe is composed of 7-in. and 8-in. rolled-steel channel sills and pressed cross members. The two center sills are provided with a top cover plate and are supported every 5 ft. 5⅝ in. by cross bearers secured to the side frames. The comparatively shallow center sill construction employed leaves the under side of the body clear for application of the electrical equipment. The shock-resisting power of the center sills is ample, as they are supported by the high side frames, as above described.

SHEATHING, ROOF AND FLOOR

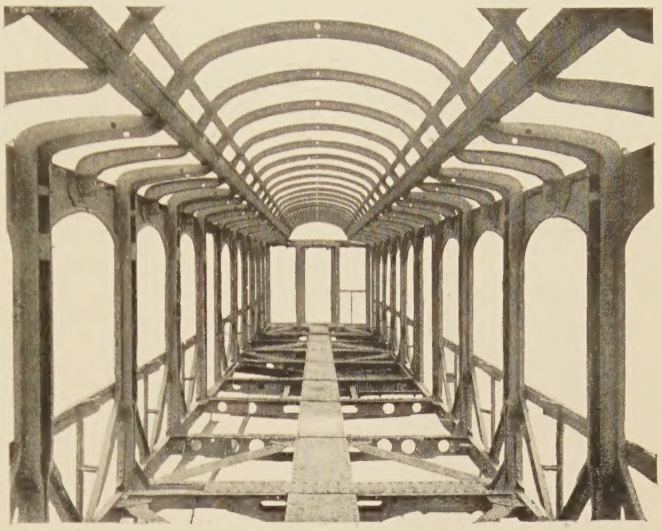
The outside of the car below the windows is sheathed with 1/16-in. steel plate. The posts above the window sills are not sheathed. The roof is formed of steel sheets about 2 ft. 8 in. wide, which are continuous from one side of the car to the other. The sheets are lapped over the carlines, riveted and then welded by the oxy-acetylene process to form a watertight joint. The floor is 1¼-in. monolith laid on Keystone corrugated sheets.

HEAT INSULATION

Special provision has been made to insulate the interior of the car against extremes of outside temperature. The entire roof and the space below the windows between the side frames and the outside sheathing is filled with a ¾-in. layer of special insulating material made by Samuel Cabot (Inc.), Boston, Mass. This is a modified form of "Cabot's quilt," which is used in large quantities for insulating buildings against heat and cold. The insulating material is faced and bound with fireproof burlap. The entire interior of the car above the floor is lined with fire-resisting Agasote and the underside of the floor is faced with ¼-in. sheets of Agasote heat insulation covered with No. 24 galvanized sheet steel.

HEATING AND VENTILATION

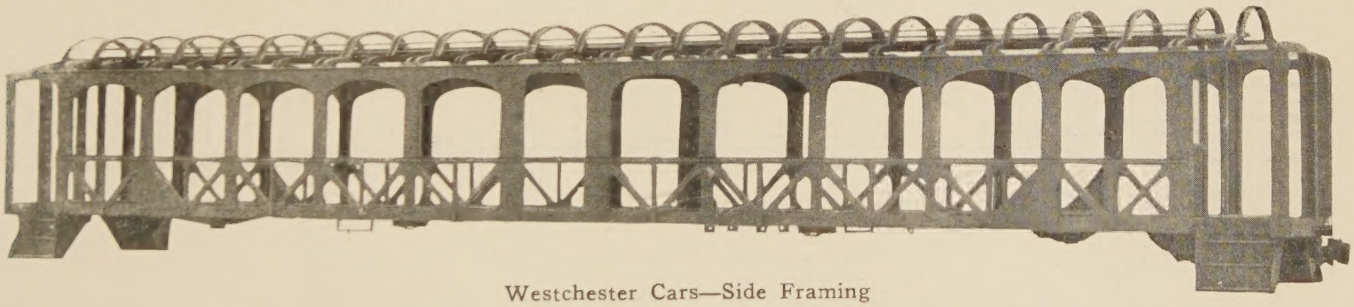
Fifteen of the cars are each equipped with twelve ventilators furnished by the Gold Car Heating Company, New York; the other fifteen are each equipped with nine Garland ventilators made by Burton W. Mudge & Company, Chicago. A Globe ventilator is used for the saloons in all cars. Both types of ventilators are mounted in the sloping sides of the upper deck. Consolidated Car Heating Company's electric heaters with tilting heat deflectors are mounted under the seats. The heater circuits will be controlled by thermostatic switches, which will maintain an approximately constant temperature in the car.



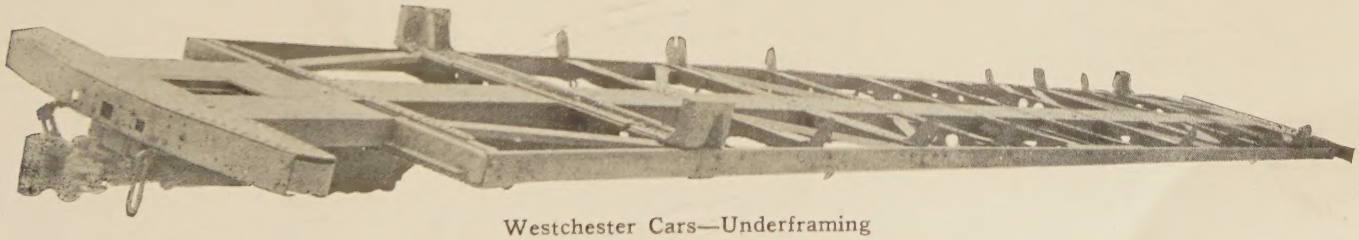
Westchester Cars—Complete Framing

PLATFORMS

The end platforms are 4 ft. 6⅛ in. long and are completely inclosed with sliding end and side doors. Each side door has an opening of 39 in. and the space above the step is closed by an O. M. Edwards Company's steel trap door. The end and center side doors are operated pneumatically, the control being by means of electric switches in the vestibules. The door-operating mechanism was furnished by the Consolidated Car Heating Company. In the ends of the platforms are two fixed circular windows, 20 in. in diameter. Below the window on the right-hand side are mounted the master controller and brake valve, which are inclosed by a folding cab door when not in use. On the left-hand side is an H. R. ratchet brake handle. The destination and marker lamps are mounted in the end of the platform just above the lookout windows, while the incandescent headlight is placed in the center of the platform hood, just above the vestibule diaphragm face plate.



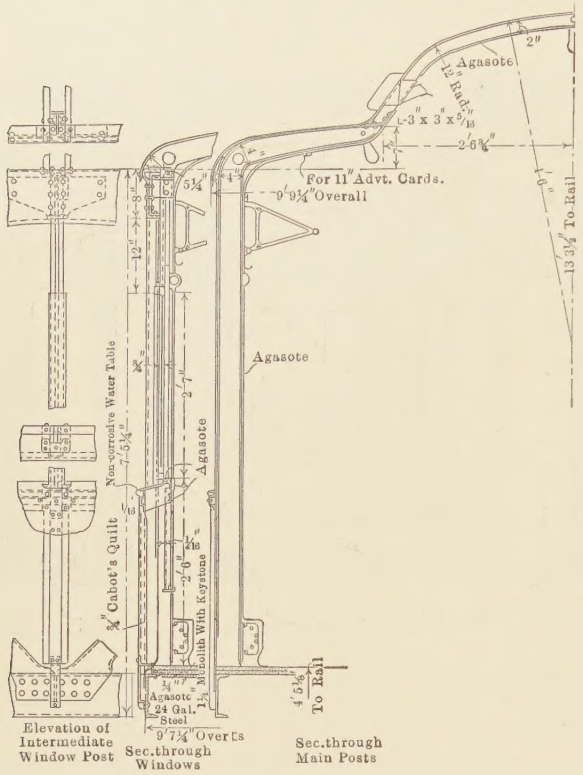
Westchester Cars—Side Framing



Westchester Cars—Underframing

DRAFT GEAR

The couplers and draft gear on these cars conform to the standard equipment of the heaviest steam railroad passenger cars. Pullman type diaphragm vestibules are used in connection with a three-stem coupler and platform buffer. The coupler is of the Buhoup three-stem type made by the McConway & Torley Company, and has M. C. B. standard contour with a 10-in. knuckle. It is attached through a pivot pin to a Forsyth friction draft gear consisting of twenty-eight plates with a capacity of 175,000 lb., carried in a steel housing riveted to the center sills just back of the end sill. The buffer plate, on a level with the platform floor, is backed up by a Forsyth buffing device, mounted between the center sills. This gear comprises two large helical springs and friction spring leaves, with a capacity of 250,000 lb., so that the total draft gear capacity is 425,000 lb. when completely closed.



Westchester Cars—Half Cross-Section

PAINTING

The exterior of the car is painted standard New Haven green, while the interior is finished in white enamel paint to afford maximum reflection of light.

LIGHTING

The car is lighted by forty-five 40-watt tungsten lamps mounted on the lower deck and distributed so that a lamp is directly above each seat. These lamps will be wired in multiple on a 110-volt circuit fed from a tap on the main transformer. There are also ten 10-watt tungsten lamps connected to the 32-volt battery circuit.

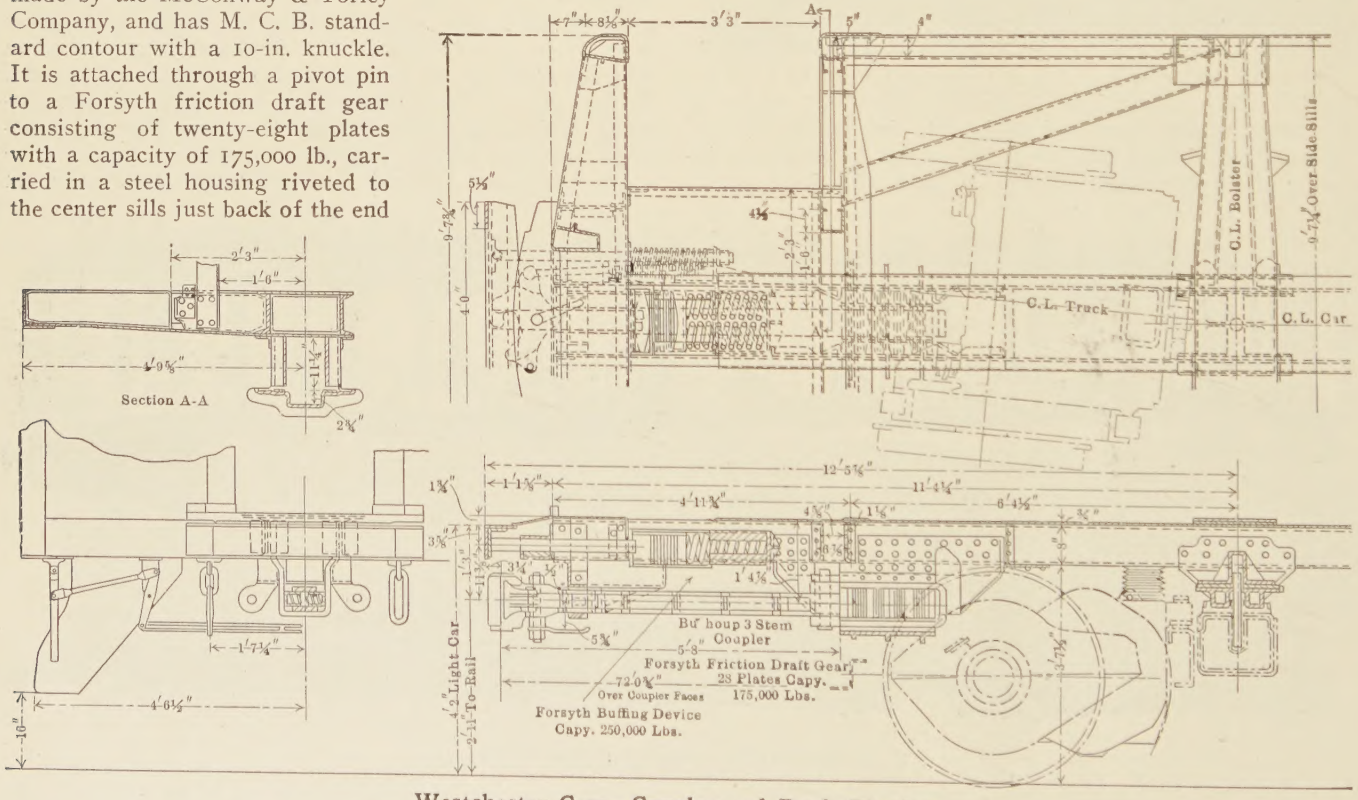
WEIGHT

The estimated weight of a car completely equipped for service is 120,000 lb. A car of similar design equipped as a trailer coach, without center doors and seating eighty-eight passengers, would weigh approximately 80,000 lb., as considerable material entering into the construction of a motor car is required for the support of control apparatus and could be omitted on cars used as coaches only.

TRUCKS

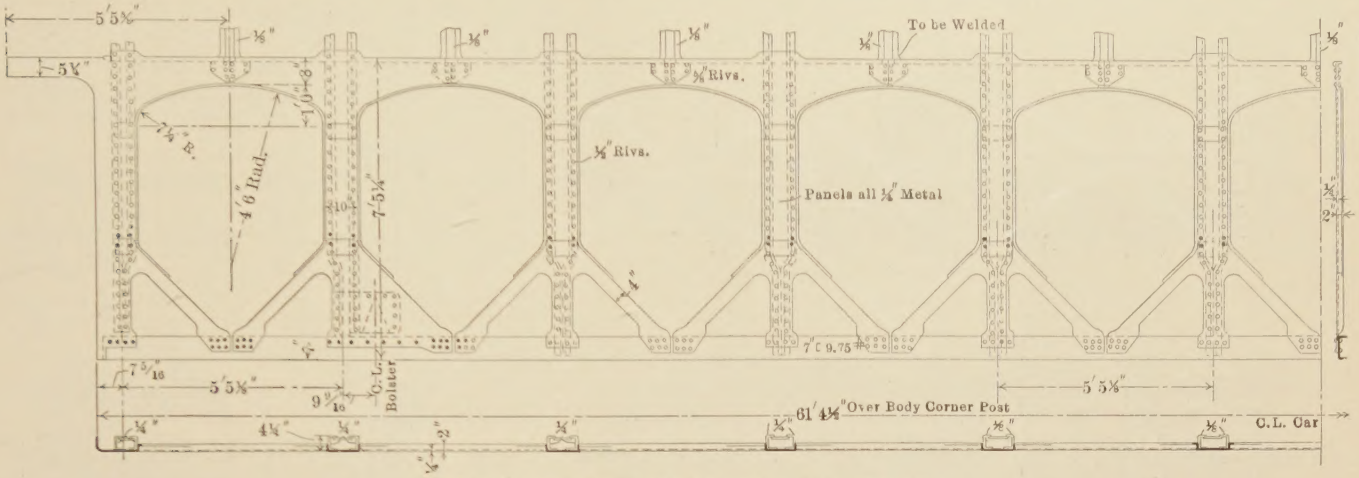
The motor and trailer trucks which are used under these cars are similar in design, but the trailer trucks have smaller wheels and axles and a different arrangement of brake rigging from that on the motor trucks. The truck side frames are of the arch-bar type with cast-steel pedestals inclosing triple-coil journal-box springs. A Z-bar is used for the top arch-bar, while the inverted arch-bar is a heavy angle which is securely riveted on the back of the top flange of the arch-bar over the journal boxes. The transoms are pressed-steel channels and are attached to the side frames by large cast-steel gussets. A pressed-steel, box-type bolster 14 in. wide is used resting on quadruple elliptic springs.

Each motor truck is fitted with eight brakeshoes, two shoes being applied to each wheel. The purpose of this clasp brake design is to reduce the pressure per brakeshoe to reasonable limits when an emergency application of the air brake is made. It also minimizes the heating effect on the brakeshoes, as the regular schedule in which

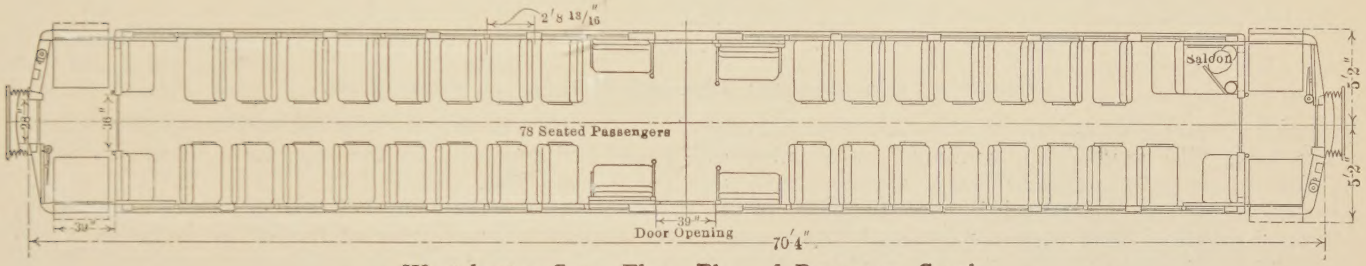


Westchester Cars—Coupler and Draft Rigging

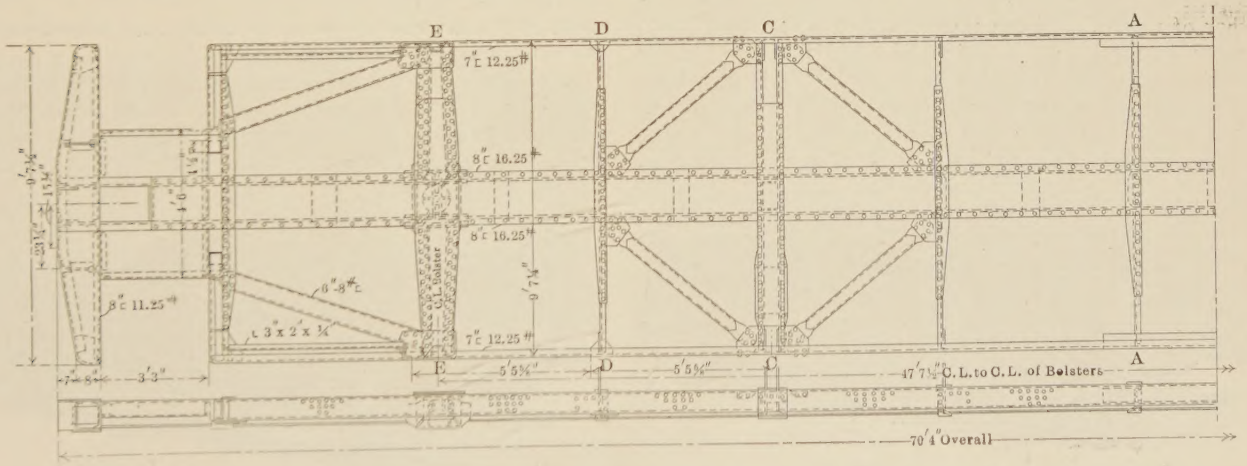
these cars will be used involves frequent station stops from high speeds. A short brake rod with a clevis and roller connects the cylinder lever to a radius bar. The latter is supported at each end by rocking levers which tend to move by gravity into a position to release the brake-shoes when the pull from the air brake cylinder is released. From each end of the radius bar a rod extends toward the transoms and is attached in the center of a short horizontal floating lever. The inner end of this lever is fastened to the top of a live brake lever, carrying a shoe bearing on the inside of one wheel. A pair of rods straddling the wheel connect the bottom of this live lever to the bottom of the dead lever which is hung from the truck end frame. Means are provided for adjusting the length of these bottom connections as the shoes and wheels wear. The outer end of the horizontal floating lever is connected by a rod to the end of a centrally pivoted lever of the same length on the other side of the bolster. The inner end of this pivoted lever is fastened to the live brake lever of the other wheel. The arrangement of levers on each side of the truck is the same, but the two sides operate independently of each other except for the single connection through the radius bar. The trailer truck brakes are of the inside hung type with a top brake beam connecting the two live levers. The braking pressure applied on the trailer truck wheels being much less than that applied on the motor truck wheels makes four brakeshoes sufficient.



Westchester Cars—Unit Section Side Framing



Westchester Cars—Floor Plan of Passenger Coach

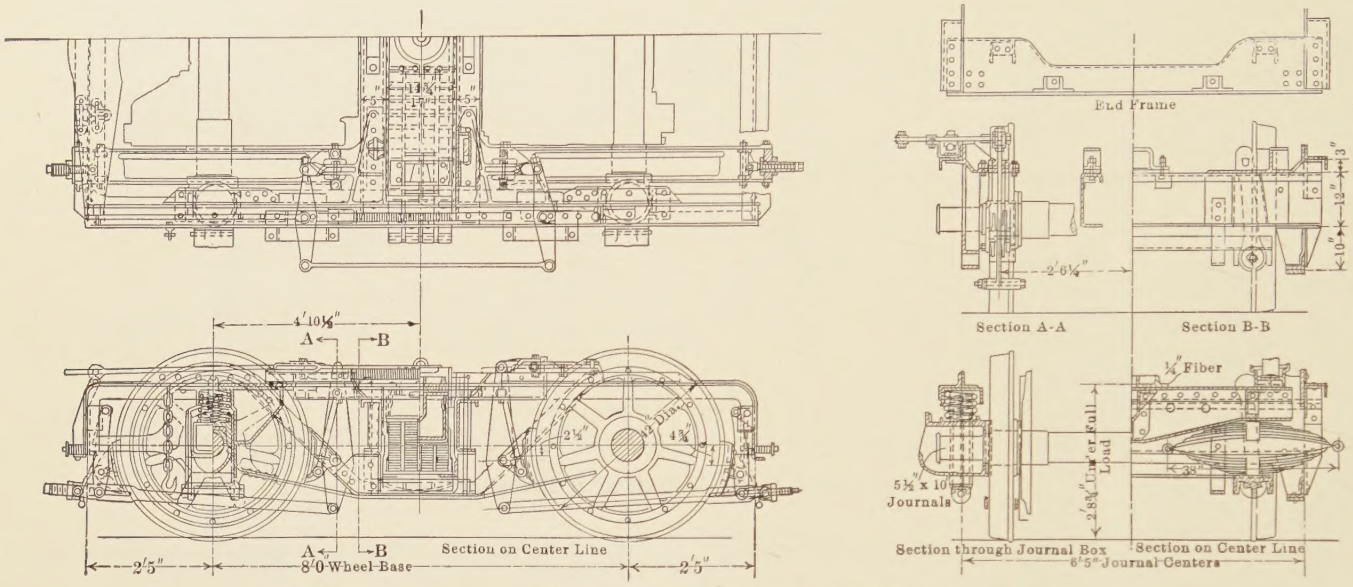


Westchester Cars—Plan and Sections of Underframe

AIR AND HAND BRAKES

The brake equipment of these cars represents a radical departure from previous equipments. Present-day conditions of operation of electric trains as exemplified on the New York, Westchester & Boston have made necessary the development of brake apparatus of greater power and efficiency than that formerly used in steam or electric

service. Three important factors entered into the problem of designing suitable brake equipment for these cars, namely: (1) A total weight of 120,000 lb. without passenger load, which exceeds the braking power capacity of the largest practicable size of single brake cylinder. (2) High schedule speed, making necessary high braking power in emergency applications and emphasizing the importance of obtaining maximum braking power in the cylinders immediately following the movement of the motorman's brake valve. (3) The gradual but continued introduction of factors which tend to reduce brake efficiency, such as heavier foundation brake rigging, excessive false travel, stronger release springs, greater leakage from larger cylinders and a reduced coefficient of friction between the brakeshoe and the wheel, as affected by speed, time of stop and intensity of brakeshoe pressure per square inch of surface.



Westchester Cars—Sections, Plan and Elevation of Motor Truck

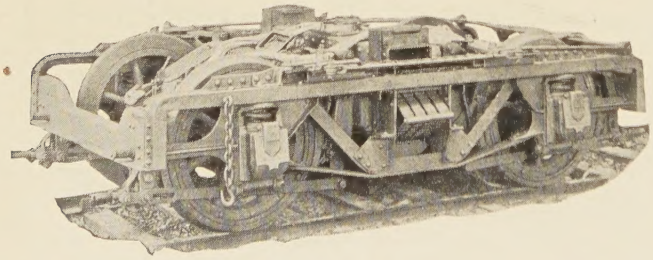
In order to meet these conditions it was evident to the engineers of the Westinghouse Air Brake Company that the fundamental functions of the ordinary quick-action, automatic air brake would have to be supplemented by a number of novel additional functions, some of which could be secured only by the addition of electric control to the pneumatic portion of the brake apparatus. The brake equipment as applied consists of a combination of the most improved form of pneumatic service and emergency brake with control of both service and emergency operation. While the brakes are controlled electrically in normal operation, the pneumatic control is held in reserve without its efficiency being in any way impaired by the electric operation. The use of the Westinghouse governor synchronizing system insures an equal division of the work of furnishing compressed air for braking and other purposes among all the air compressors in the train.

The brake equipment, designated as Schedule A M C E, comprises two brake cylinders, a supplementary reservoir, a control valve and the brake valve, in addition to the usual cut-out cocks, hose couplings, etc. One brake cylinder, 14 in. x 12 in., is connected through suitable foundation brake leverage to the motor truck brakes, and the other cylinder, 12 in. x 12 in., is connected to the trailer truck brakes. The brake cylinders are mounted close to the trucks at each end of the car so as to reduce the length of the brake rods to a minimum. The brake levers at the two ends of the car are not connected together but are moved independently by the separate cylinders to which they are attached.

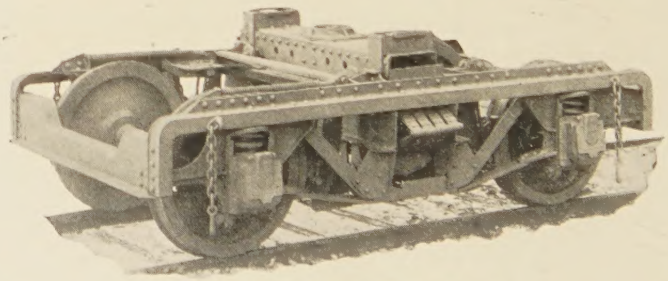
Both brake cylinders operate during service applications, the maximum pressure being limited to 50 lb. on a full service application with a brake-pipe pressure of 70 lb. When an emergency application is made, however, full main reservoir pressure (90 lb. to 100 lb., according to whether the governor is just about to cut in or cut out) is admitted in the shortest practicable time to both the brake cylinders, thus giving the necessary increased braking power for emergency applications by approximately doubling the service application pressure and so obtaining twice as much braking power in emergency applications as the maximum possible in service.

A single control valve performs automatically all the functions of the improved types of triple valves and, in addition, provides for maintaining the pressure in both brake cylinders constant against leakage, for producing full emergency pressure at any time irrespective of the pressure which may be in the brake cylinders, and for obtaining maximum braking power more quickly than ever before. The control valve operates alike in response to either electric or pneumatic service and emergency applications.

The brake valve consists of a pneumatic portion controlling the pneumatic operation of the brakes and an electric portion which is added to provide for the electric



Westchester Cars—Motor Truck



Westchester Cars—Trail Truck

control of the brake system. The distinction between the two systems lies in the manner in which the brake pipe reduction is made. In the electric control the brake pipe reduction is made locally by the service application magnet valve on each car, while in pneumatic operation the brake pipe reduction is made through the brake valve. The brake valve has the same position of the handle for either electric or pneumatic service and emergency operation, the various positions being release, holding, handle off, lap, service and emergency. In case the electrical features should be rendered inoperative through loss of current, breakdown or for any other cause the brakes can be operated pneumatically, and will so operate automatically, whether the motorman is aware of the failure of the electric control or not.

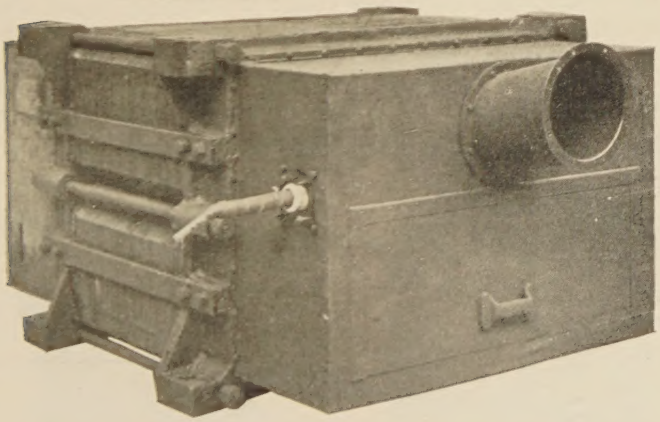
HAND BRAKE

The ratchet hand brake at each end of the car is connected to the live cylinder at the same end through a shaft with differential pulleys over which run chains attached to the hand brake rod and an extension of the live cylinder lever. In this way the leverage of the hand brake is very largely increased.

MOTOR EQUIPMENT AND WEIGHT DETAILS

Each of the cars is equipped with two Westinghouse No. 409 six-pole, single-phase motors. The motors will be operated with forced-draft ventilation, and under these conditions each motor has an hourly rating of 175 hp and a continuous rating of 145 hp. These motors are sufficiently powerful to develop an acceleration of 1 m.p.h per second on straight and level track.

The armature windings are provided with short-circuited auxiliary coils adapted for use on alternating current only. These armatures are interchangeable with those



Westchester Cars—Auto-Transformer, Showing Position of Air Duct

recently ordered by the New York, New Haven & Hartford Railroad for the new twin motors of the electric locomotives.

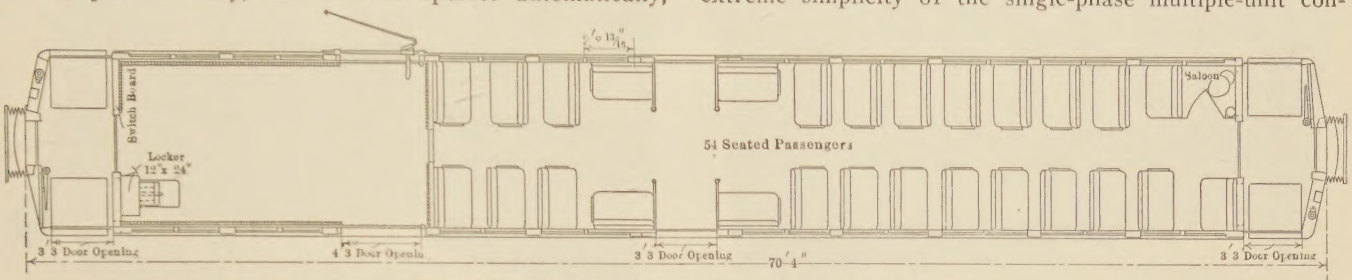
The air for forced ventilation of the motors and transformer is supplied by a motor-driven blower. The air is taken in through openings in the side of the car to insure its being as free from dust as possible. The car center sill is utilized as a duct to take the air from the blower to the motors, and a bellows connection of heavy canvas is used to carry the air from the center sill to the interior of the motors.

The weights of the various parts of the electrical equipment are as follows:

	Pounds.
1 air blast transformer	5,300
2 pantograph trolleys at 750 lb. each	1,500
1 switch group	1,250
1 blower outfit complete	650
Other electrical equipment, including cables	2,550
2 motors at 6,600 lb. each, including gears and gear cases	13,200
Total, motors and control	24,450

CONTROL SYSTEM

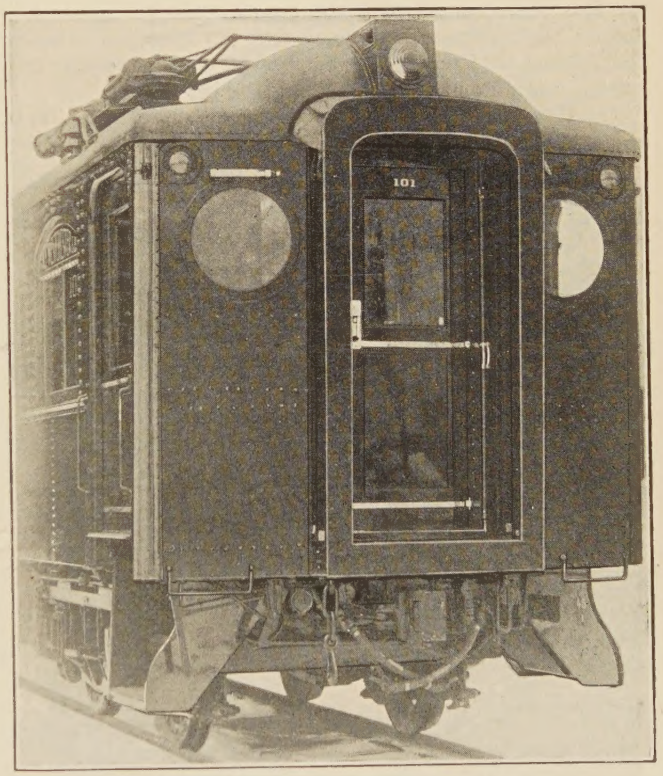
The control equipment offers a striking example of the extreme simplicity of the single-phase multiple-unit con-



Westchester Cars—Floor Plan of Combination Car

trol equipment when it is operated on alternating current only. There are a high-tension line switch for cutting off power from the primary winding of the transformer, a reverser for controlling the direction of motion of the car and seven switches for speed control in starting.

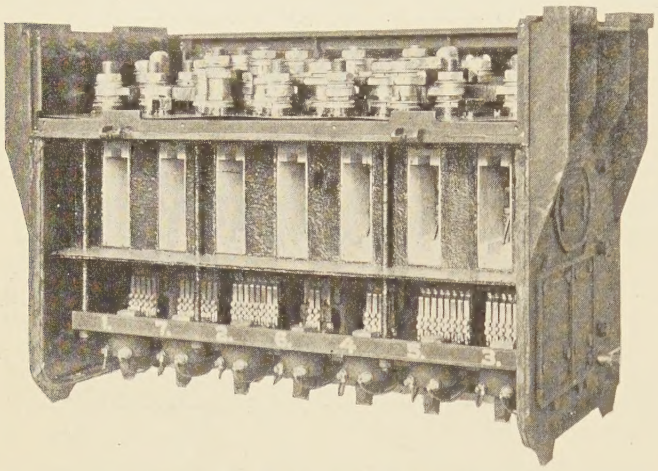
The acceleration is controlled by an automatic relay, and there are three running positions as well as three inter-



Westchester Cars—Head-on View, Showing Motorman's Portholes

mediate positions with resistance in circuit. In the three running positions the motors are connected without resistance to three different taps on the transformer. This makes it possible to run the equipment continuously at any one of three different speeds, instead of the two continuous running speeds, series and parallel, which are provided on direct-current equipment. The cast-grid starting resistances are made up in a single frame weighing about 300 lb.

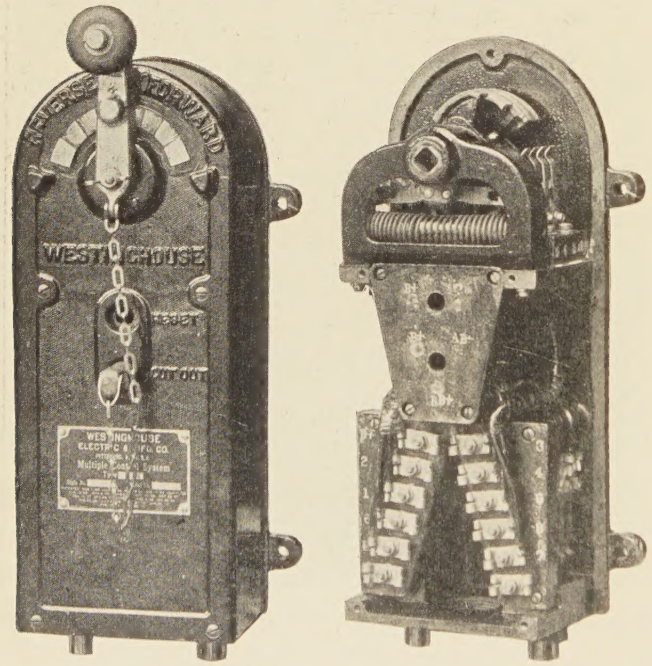
The master controller is provided with three notches. If the handle is placed at the first notch it causes the unit switches to close which connect the motors to the lowest voltage tap of the transformer. If the handle is placed at the second notch other unit switches will close which connect the motors to the middle voltage tap of the transformer, and when the handle is placed at the third notch



Westchester Cars—Switch Group

still other switches will close to connect the motors to the highest voltage tap of the transformer or full-speed running position. If the handle is moved immediately to the first, second or third position the unit switches will close automatically under the direction of the limit switch until the first, second or third running position is reached. The master controllers are provided with an automatic release or "deadman's handle" for cutting off the current to the motors and automatically applying the brakes.

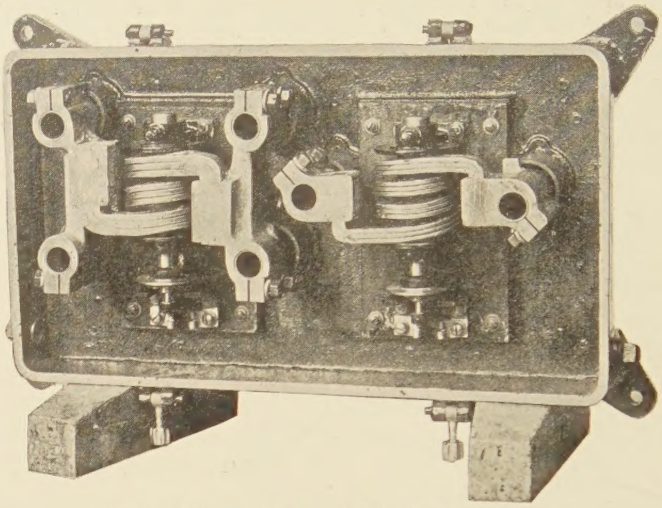
The unit switches are of the pneumatically operated type and are of ample capacity for the heavy currents which



Westchester Cars—Master Controller With and Without Cover

they are required to handle. The pneumatic cylinders furnish ample power for closing and opening, and the apparatus is so designed as to be easily accessible for inspection and maintenance. The reverser is of the drum type and has a continuous carrying capacity of 500 amp.

An over-speed relay is provided to prevent the cars exceeding a speed of 57 m.p.h., which was determined as a suitable maximum speed for the service. The over-speed relay consists of two coils, one connected in series with one of the motors, and the other connected in shunt across the same armature. The speed of a motor depends upon the current and also upon the voltage, so that a motor

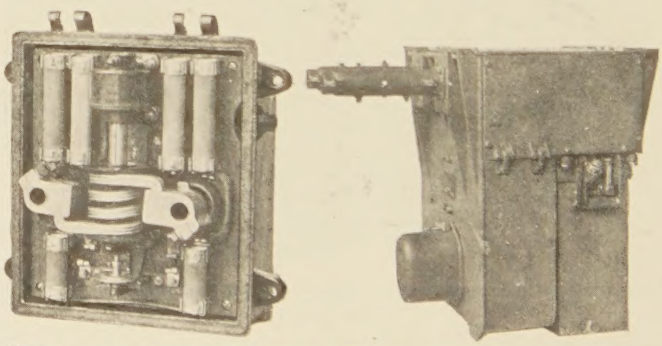


Westchester Cars—Limit Switch

may operate at a given speed either by carrying a small current at low voltage or by carrying a large current at a higher voltage. The magnetic effect of the two coils of the over-speed relay is so arranged that the action of the voltage coil tends to oppose that of the current coil. Consequently, when a certain definite relation between the current and voltage is exceeded the control circuits of certain switches are opened and power is cut off from the car. These switches cannot be closed again until the handle of the master controller has been returned to the "off" position.

The power for operating the magnet valves of the switches is obtained from a motor-generator set in connection with a 32-volt storage battery. The motor-generator runs continuously and supplies not only the current for the control apparatus but also current for operating the electric brakes, the valve magnets for the door-operating devices and ten emergency lamps. The battery is kept fully charged and only comes into service in case the power goes off the line, thereby stopping the motor-generator set.

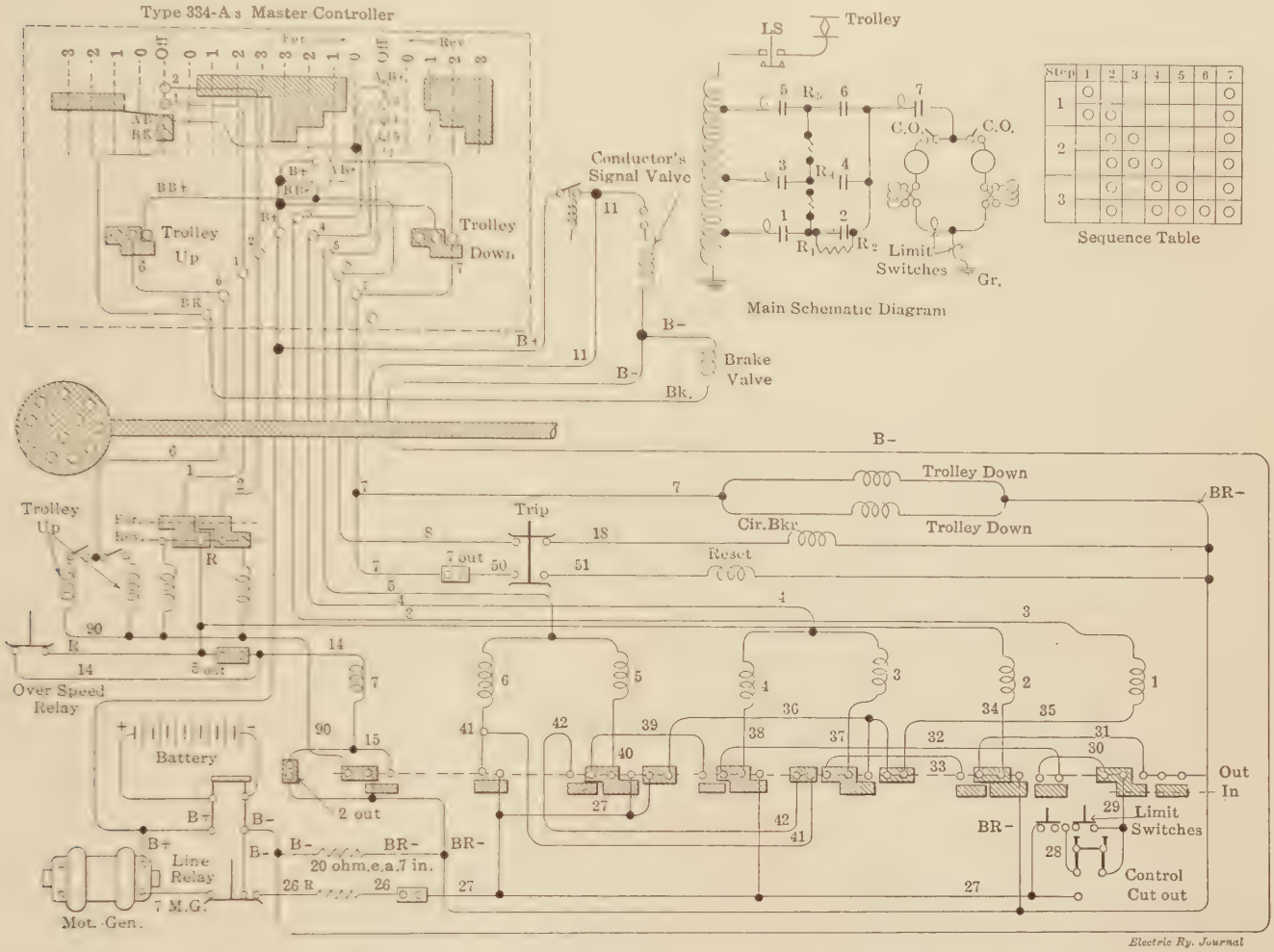
A line relay is provided and so connected that in case the power supply is interrupted all of the unit switches open. When the power is restored the switches automatically close under the action of the limit switch in the same manner as if the master controller has been turned to the "off" position and then notched up to the running position. The control equipment is provided with cut-outs so that either one of the two motors may be cut out of service and the car operated by the remaining motor.



Westchester Cars—Overspeed Relay and High-Tension Oil Switch

A high-tension oil switch is provided which has an automatic tripping arrangement somewhat similar to the overload tripping device used on all Westinghouse direct-current, unit-switch equipments, but in this case there is provided a special dash pot or time-element device which resists a sudden pull but yields when the pull is continued. This device permits the circuit breaker to be set at a low tripping value as a protection against moderate short-circuits and at the same time prevents the tripping of the circuit breaker due to momentary heavy surges of current which may occur when the control circuit is interrupted as in passing section insulators.

Two pantograph trolleys are provided, located above the center of each truck. These pantographs may be raised or lowered by means of air cylinders which are controlled by electropneumatic valves operated from push buttons at the master controller. Either one of the pantographs can be used to supply current to a car, and the two pantographs are provided so that there will always be one spare pantograph available.



Westchester Cars—Diagram of Control Equipment for Single-Phase Motors

The budget of the Dominion government providing transportation aid in the form of railway and bridge subsidies was reduced on March 19 to $22,927,200. The subsidies provided $6,400 a mile for 3,433 miles of railway. Of the total railway mileage subsidized 1882 miles are renewal of former votes, the subsidy amounting to $12,044,808. There are 1551 miles of new line authorized to receive subsidies which at the maximum would receive aid to the amount of $9,965,400. The electric railways which are to receive subsidies include the Rainy River Radial Railway from Fort Frances, on Lake of the Woods, to the mouth of the Little Grassey River, 50 miles; the Lake Erie & Northern Railway, 68 miles, and the Burrard Inlet, Tunnel & Bridge Company, 31 miles.

EXPRESS COMPANY MILEAGE ON ELECTRIC ROADS

The Interstate Commerce Commission has issued the second annual report on the statistics of express companies in the United States. It is for the year ended June 30, 1910. This shows the division of express mileage as between electric lines, steam roads, steamboat lines and stage lines. There was a decrease of 2,378.27 miles in the total mileage covered in 1910 as compared with 1909. The mileage on electric railways, however, increased 194.78 miles.

Figures of the total mileage and electric line mileage of the various express companies for the fiscal years ended June 30, 1909 and 1910, are as follows:

Name of Carrier	Total Mileage		Electric Line Mileage	
Year Ended June 30	1910	1909	1910	1909
Adams Express Company....	36,495.00	34,360.00	245.00	196.00
American Express Company.	55,577.84	48,224.78	572,95	475.70
Canadian Express Company..	7,128.27	7,794.27	66.00	66.00
Canadian Northern Express Company	3,314.50	3,129.62	22.00	22.00
Globe Express Company....	1,915.65	1,899.85	....	....
Great Northern Express Company	8,215.37	7,412.16	169.59	169.59
National Express Company..	1,640.25	1,714.25	70.00	6.00
Northern Express Company.	6,862.47	6,757.75	8.00	8.00
Pacific Express Company...	16,962.43	22,672.54	515.20	343.00
Southern Express Company.	32,213.00	33,181.00	80.00	80.00
United States Express Company	32,771.46	24,206.00	3,205.13	3,604.96
Wells, Fargo & Company....	51,522.84	65,698.43	1,650.92	1,438.76
Western Express Company..	3,509.69	3,456.39	4.00	4.00
Total	258,128.77	260,507.04	6,608.79	6,414.01

The record of passenger train performances on the steam railroads of New York State for January shows that during the month the number of trains run was 63,976. Of the number of trains run, 70 per cent were on time at the division terminal. The average delay for each late train was 49.8 minutes, and the average delay for each train run was 14.9 minutes.

DISCUSSION ON PARKS BEFORE THE ILLINOIS ELECTRIC RAILWAYS ASSOCIATION

An account of the first part of the proceedings of the Chicago meeting of the Illinois Electric Railways Association on March 22 was presented in the last issue of the Electric Railway Journal. Later during the meeting there was an interesting discussion on summer parks and traffic matters.

The paper first discussed was that by A. W. Jordan, superintendent of parks Chicago & Joliet Electric Railway. Fred E. Fisher, Chicago, Ottawa & Peoria, said that Dellwood Park, on Mr. Jordan's road, was the finest electric railway park in Illinois, but he questioned whether the company might not have gone too far in spending money for beautifying and developing it. Mr. Fisher described the means taken by the Joliet, Plainfield & Aurora road, of which he had been manager, to obtain traffic to and from a park of 15 acres which the company had established midway between Joliet and Aurora. This park was located on the Du Page River, which had been dammed so that boating and bathing facilities were afforded. Many trees were planted about the park to supplement the natural features. But these attractions had not been so much the means of bringing about the success of the park as the establishment of a cottage colony in this small park, which drew its patronage entirely from two medium-sized cities, netting the electric railway company between $4,000 and $8,000 each year for the past eight years. At a cost of $75 each, a number of canvas cottages having good floors and permanent sides for a height of about 4 ft., surmounted by a canvas roof, had been built in the park. The railway company installed gas for heating and lighting, furnished a two-burner gas hot plate in each cottage and rented the four-room cottages for $15 a month and the six-room cottages for $18 a month. There were now sixty-four such cottages at this park, and all were occupied from May until October. This cottage colony formed a nucleus for a steady park traffic throughout the week because the cottagers went to and from the neighboring cities to work. In addition to furnishing cottages at the low rent the company gave a free high-class dance every Saturday night, and these two features had been the means of bringing about the success of the park. The cottage feature was one that might be applied to any rural park.

Mr. Fisher also described the park owned by the Chicago, Ottawa & Peoria Railway. This was a small, unpretentious amusement resort, the buildings of which had cost about $15,000. The park always had been operated at a loss, and the loss was largely occasioned by an attempt to give good vaudeville entertainments. Mr. Fisher suggested that it might be a successful and economical plan for the electric railways in Northern Illinois to arrange a vaudeville circuit and provide for transferring the shows from one park to another every second or third night. It had been his experience that after a show had stayed at the park for two performances the interest in it lagged, so that it was unsuccessful in drawing crowds for the remainder of the week. He also said that his company was planning to reopen an old park located on the Morris-Joliet extension of his road. This park as originally laid out had been a failure, because the only means of transportation to and from Joliet was by boats on the canal. It was now on the new electric railway extension and gave promise of being successful.

Robert J. Barnett, Kankakee, Ill., described the tent cottage colony at Electric Park, Kankakee. This colony had only 20,000 population to draw from, but twenty tent cottages as described by Mr. Fisher had been built. Each cottage was rented at $75 per year, and the results had been very gratifying to the local electric railway company.

Mr. Barnett also mentioned a firm located at Toledo which made a business of furnishing equipment for the outings of the employees of large industrial and commercial organizations in the Central States. This firm will undertake to furnish cottages at a resort, or tents if desired, and will run a commissary department so that the guests need have no camping equipments of their own.

W. O. Woodward, Chicago, Lake Shore & South Bend, described a park which his company owned. It included 77 acres located on Hudson Lake, 16 miles west of South Bend, Ind., the eastern terminus of the road. The railroad had no investment in the park other than the land, but this was leased to a manager for a term of years, and he had erected suitable buildings for the accommodation of summer cottagers and picnics and dancing parties. The lease required that a certain number of cottages be maintained in good condition. Last spring ten cottages of four and five rooms each were built. These are supplied with ice and fuel, and the cottagers are supplied with a boat on the lake, the cost for the entire combination being $10 per week. This park arrangement had been very satisfactory for the road. It was only a traffic getter. The success of this cottage colony had induced the owner of nearby land to plat it into twenty-eight lots, which had quickly been sold, and already eight cottages had been built for this coming season. Mr. Woodward said that the commutation rate for twenty-five round-trip tickets from South Bend to Hudson Lake Park was on the basis of 40 cents for a round trip, while the straight round-trip fare was 55 cents. The commutation tickets were good during the calendar month and good for bearer.

E. E. Downs, Elgin & Belvidere Electric Railway, spoke of his attitude toward electric railway parks. In his twenty years' experience he had never been connected with a road which owned a successful park, and he was glad that the company with which he was now connected had no park.

A. E. Blackburn presented a paper on interurban outings which was published in last week's issue on page 470. Mr. Woodward called attention to Mr. Blackburn's suggestions regarding the endeavor on the part of an electric railway traffic agent to get announcements in the society columns of the newspapers regarding outings at the parks. These were very valuable advertisements for the electric railway.

A general discussion followed on the value of different classes of music and other entertainment for summer parks.

On invitation of President Faber, J. V. Hoge, of the Automatic Signal & Appliance Company, Cleveland, Ohio, described the automatic block signal system which his company has had on trial on the Lake Shore Electric Railway during the past year. This signal is operated by a trolley contactor and has been credited with very satisfactory operating results.

Charles Jones, superintendent of transportation Aurora, Elgin & Chicago Railway, described the children's park which was a part of the larger general amusement resort operated by his company. This children's park was in an inclosure within the larger park which had been fitted with miniature amusement devices for the entertainment of the children. A nurse was provided to care for the children and no charge was made for their attendance.

Secretary Flenner read the by-laws of the new Illinois Electric Railways Traffic Association, but discussion on this matter was postponed until the next meeting on account of the absence of George Quackenbush, chairman of the traffic association.

The following committees were appointed: Committee on membership: C. F. Hewitt (chairman), general superintendent, East St. Louis & Suburban Railway Company; C. H. Cox, general manager, Central Illinois Public Service Company; Frank E. Johnson, district sales agent, Ohio Brass Company.

Program committee: C. E. Flenner (chairman), auditor, Aurora, Elgin & Chicago Railroad Company; L. E. Gould, Western editor Electric Railway Journal; F. A. Stowe, general agent, Illinois Traction System.

Traffic committee: R. A. Barnett (chairman), formerly traffic agent, Chicago & Southern Traction Company; G. W. Quackenbush, traffic manager, Illinois Traction System; R. Breckenridge, traffic agent, Aurora, Elgin & Chicago Railroad Company; W. O. Woodward, traffic manager, Chicago, Lake Shore & South Bend Railway Company; A. W. Jordan, traffic agent, Chicago & Joliet Electric Railway Company; C. C. Shockley, general freight and passenger agent, Rockford & Interurban Railway Company.

Committee on signals: J. Leisenring (chairman), signal engineer, Illinois Traction System; E. F. Gould, assistant to general manager, Aurora, Elgin & Chicago Railroad Company; L. E. Gould, Western editor Electric Railway Journal; M. J. Feron, general superintendent of transportation, Chicago Elevated Railways.

Publicity committee: F. G. Buffe (chairman), manager department of publicity, Illinois Traction System; C. E. Patten, general agent, Metropolitan West Side Elevated Railroad Company; A. A. Anderson, general manager, Springfield Consolidated Railway Company.

WITHDRAWAL OF REDUCED TICKET FARE AT WILMINGTON, DEL.

A decision was rendered by Judge Edward G. Bradford in the United States District Court at Wilmington, Del., on March 5 in the fare case of the Wilmington & Philadelphia Traction Company vs. the Wilmington Public Utilities Commission. The case was instituted by several of the affiliated railway companies in the Wilmington system against the five men who constitute the Board of Public Utility Commissioners for the city.

The company applied for a preliminary injunction to restrain the commission from enforcing an order made on Sept. 1, 1911, directing the renewal, beginning with Sept. 20, 1911, of the sale of six tickets for 25 cents. The order of the commission also provided that the company should pay a penalty of $100 per day for violation.

The established rate of fare charged by the Wilmington & Philadelphia Traction Company and its lessor companies never has been less than 5 cents, although for a period of ten years or more prior to Aug. 13, 1911, on the request of passengers using the lines, six tickets in a strip were sold for 25 cents. However, the extension of this privilege, the court holds in its decision, did not abolish or suspend the established 5-cent rate.

When the ticket rate of fare was withdrawn a complaint was made to the commission. This complaint was merely a brief statement of facts. The court points out in its decision that the complaint did not allege that the discontinuance of the sale of tickets was either unlawful or unreasonable. It did not aver that the established 5-cent fare was unjustifiable or improper.

"It assumed," the decision says, "apparently without regard to chartered rights or the financial necessities of the traction company, that the public interest demanded that six full 5-cent fares should be sold for 25 cents. Doubtless there are many persons in the community who would find it convenient or profitable for the traction company to carry them for a fare of 1 cent or free, or give them a bonus for riding on its cars; and with persons so carried the company would enjoy unbounded popularity. But such self-sacrificing altruism toward the general public would hardly be compatible with proper regard for the interests of those who, in good faith, have invested their money in the railway enterprise in the legitimate and natural expectation of a fair and reasonable return."

A full history of the subsequent proceedings is given in the decision. In his reply to the notice issued by the board on receipt of the complaint, Oscar T. Crosby, president of the company, stated that the act of withdrawal of the tickets was clearly within the chartered authority of the lessor companies and within the legal rights of the controlling company. The company added that this action was not taken hastily or without due consideration, but, on the contrary, with a view to the fulfilment of its obligations to the city, as a corporation, to the traveling public and to its employees, creditors and stockholders. The company further submitted that it was not within the jurisdiction of the commission or any tribunal to make orders relative to the rate of fare which should be charged within the limits of 5 cents per passenger.

The complaint came before the commission for consideration at two meetings. At the conclusion of the second meeting, without the examination of a book or the swearing of a witness, the order was made. The complainants contend that the enforcement of the order would involve a violation of the constitution of the United States.

Severe criticism is expressed in the decision of the arbitrary attitude of the board at the two hearings held in the case. The court says:

"It is difficult to conceive a treatment more arbitrary, injurious or ruthless than that to which the traction company was subjected by the board. A malefactor taken red-handed in the commission of crime would have had a constitutional right to a measure of protection and consideration denied to the traction company. The board, influenced and practically controlled by its own counsel, instead of maintaining an attitude of judicial and legislative impartiality, became the prosecutor and displayed a spirit of partisanship to the company from the beginning to the end of the hearings. Yet it does not appear that there was any discourtesy or want of respect on the part of the traction company toward the utility board, or any act or conduct of the former intended or calculated to provoke animosity on the part of the latter."

Referring further to the conduct of the board, the decision adds: "It does not appear that any member possessed experience, special training or information rendering him competent to form a reliable opinion upon the reasonableness or unreasonableness of a straight 5-cent fare.

"The mere unexplained fact that a controlling line during a former period may have sold six tickets for 25 cents affords at most very slender support to a contention that a subsequent change from six to five tickets for that sum involves an unreasonable exaction from the traveling public. Cost of maintenance, change in wages and a variety of other circumstances may fully justify such increase in price. Clothed with ample power to investigate the merits of the case and do equal justice between the parties, the utility board allowed itself to be led into a course of action which was the antithesis of 'due process of law.'"

In conclusion the court says that a final decision in the case should be reached only after a thorough, orderly and rigid investigation of the facts in connection with the law, so conducted as to allow examination, cross-examination and re-examination of the witnesses and also production of books, papers and accounts. While the granting of a preliminary injunction would temporarily require those to pay a straight 5-cent fare who would prefer to purchase six tickets for 25 cents, a refusal of such injunction might seriously embarrass and possibly prove disastrous to the established business and property of the traction company.

A decree for a preliminary injunction, therefore, is to be prepared and submitted to the court.

DATE OF INTERNATIONAL CONVENTION

The International Street & Interurban Railway Association has announced the date of its convention this year. It is to occur July 2 to July 5. The place of meeting has already been announced. It is Christiania, Norway. At the close of the convention an excursion has been arranged to the famous fjords of Norway, to extend as far as Bergen.

All-Steel Center-Entrance Car for Brooklyn

Experimental Car Under Construction After Study of the Subject by Operating Officials—Low Step and Collapsible Motorman's Cab Are Features of the Design—Details Compared with New Manhattan Car of Similar Type

The Brooklyn Rapid Transit System has now under construction at the New Castle works of the Standard Steel Car Company an all-steel center-entrance car which is to be placed in experimental service. The question of trying a center-entrance car in Brooklyn was first considered by the management about two years ago, and preliminary studies and drawings were made at that time. Actual construction was not undertaken, however, until the necessity for purchasing additional cars for its surface lines arose and the company had had an opportunity of studying center-entrance cars operated in other cities.

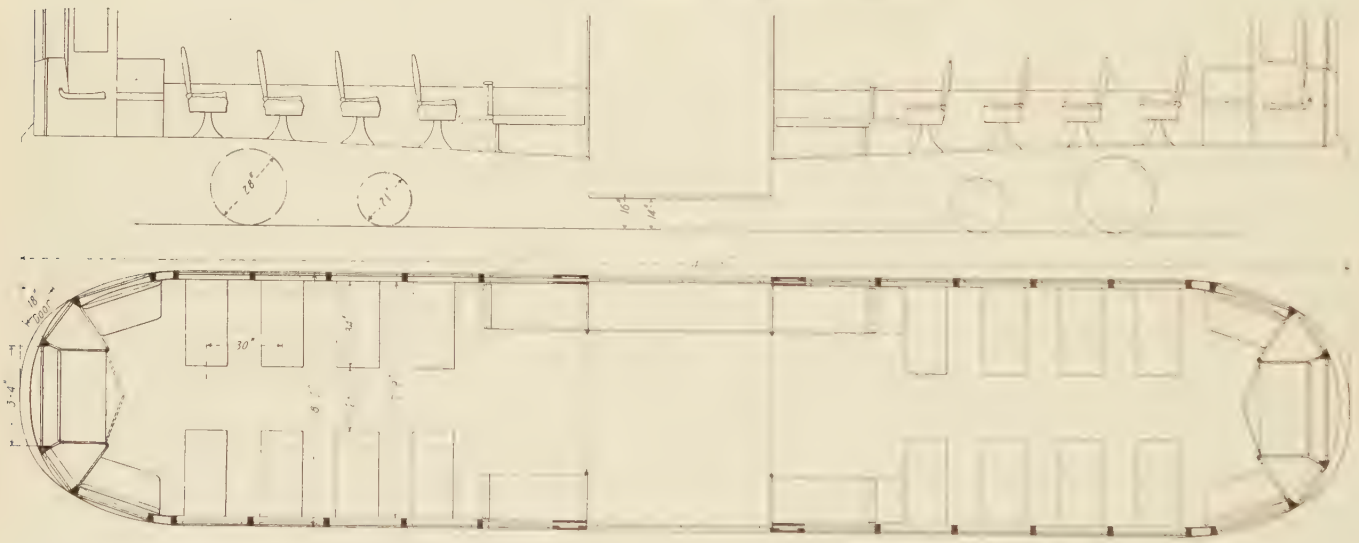
The present design, although purely experimental, has been worked out after careful preliminary studies with a template car longer and wider than any now in use. This car was operated for two weeks over the entire system to find limiting clearances due to curves, trees, poles, elevated railway columns, carhouse columns, etc. Special attention was given to the clearances above the pavement, in order to determine the lowest practicable level to which the car floor could be inclined. All of these trials were checked by the company's engineer of way and structure. It was found that most of the comparatively slight clearance changes which were required would have to be made in the carhouses. The new car is 3 ft. longer and 5 in. wider than the largest cars hitherto used in Brooklyn. These greater dimensions have been made possible by converging the cabs at the ends, by adjusting the overhang and the center to center distance between king pins and also by making minor outside clearance changes as previously noted. The weight will be carried principally by the side framing, which will be so constructed that a girder will be formed of the entire side of the car.

Perhaps the most striking feature of the new car is that the entrance is only 14 in. above the rails, with a 2-in. upward slope to the middle, whereas the height of the first step on other Brooklyn cars varies from 15 in. to 16⅞ in. Beginning at the boundary lines of the center doors, the floor is then elevated vertically for 10 in. and next is inclined upward another 6 in. on a ramp 11 ft. 4½ in. long toward each end of the car, in order to clear the trucks.

DIFFERENCES AS COMPARED WITH NEW YORK CAR

Although modifications from the company's original designs have been made, the low height at the center doors and the single step from the pavement remain among the distinguishing features of this car as they are of that of the New York Railway Company's design which was described in the Electric Railway Journal of March 16. In the Brooklyn car, however, the low entrance has been obtained without any radical innovations in the design of the bolsters or in the placing of the trucks. In fact, the changes in the Brooklyn car are confined entirely to the body. Another important difference between the New York and Brooklyn cars is that the motorman's cab in the latter is collapsible so that folding seats may be used at the end which is not in service. The New York car is 40 ft. 8 in. long over the bumpers, 8 ft. 2 in. wide over all, and has a seating capacity of fifty-one. The Brooklyn car is 45 ft. 6 in. long over all, 8 ft. 5 in. wide and can seat fifty-eight

Brooklyn Center-Entrance Car—Side Elevation



Brooklyn Center-Entrance Car—Plan and Longitudinal Section

passengers when operating in either direction by making use of all stationary and one-half of the folding seats.

AISLES AND ROOF

The employment of roof pockets for the windows has permitted wider aisles and cross seats than in the present convertible cars in Brooklyn. Thus, the aisle of the new car is 25 in. wide instead of 23¾ in., and the available seating space of the cross seats is 33 in. instead of 31 in.; these dimensions are practically the same as those of the New York car. The center doors are of the double-sliding type and are pneumatically operated. The width of this opening is 6 ft. 6 in., compared with 3 ft. 10 in. for the New York car. The conductor will be located opposite the middle of this opening as is usual on center-entrance cars. A buzzer push-button system is provided for passenger signals, and an illuminated door signaling device is also provided to notify the motorman when doors are closed and that the car can be started.

MATERIAL USED IN CONSTRUCTION

The Brooklyn car is constructed entirely of fireproof material, with the exception of the standard design of cherry slat seats and seat backs which were furnished in equal quantities by two manufacturers. Grab handles at the seat corners and stanchions are provided to give the passengers sufficient support in moving through the cars. The grab handles are of the Brooklyn Rapid Transit's standard type. Metal is used throughout except that the flat-arch roof is of agasote without canvas top or headlining, and agasote is also used for the interior sheathing, to serve the twofold purpose of insulation and finish. Brass framing is to be used for the window sash and the center doors are to be of aluminum.

SEATING ARRANGEMENT

The arrangement of the seats and of the motorman's cab is clearly shown in the accompanying drawings. It will be observed that the motorman's door leading to the street is placed at one side. This arrangement makes it possible to use a center sash fully 40 in. wide, thereby giving the motorman an excellent angle of vision. When the cab is folded, two small triangular compartments are formed at each side, one to shut off the motorman's door and the other to inclose the hand-brake, switchboard and cab heater. Consequently, the end doors will not be available for unauthorized use, nor will the passengers who are seated near the folding cab have any opportunity to tamper with the equipment mentioned. It is possible that the seating capacity of the car will be increased to fifty-nine or sixty by a more compact folding of the cab section opposite the motorman's door.

No. 88 ring curtain fixtures and steel curtain rollers, which are the company's standard, are used with double-coated pantasote curtains made in the railroad company's own curtain repair department. The railroad company's standard incandescent headlight and adequate car lighting in conduits and suitable outlet boxes are also provided. The ventilation is of the Wilson automatic mechanical type, which has been largely installed on cars in Chicago and which has received the approval of the board of health and board of supervising engineers of that city.

TRUCKS AND MOTIVE EQUIPMENT

The body is mounted on the Standard Motor Truck Company's maximum traction trucks of 4-ft. 6-in. wheelbase, which are placed 24-ft. 8-in. centers, and which are fitted with Carnegie rolled steel wheels and treated axles. The present plans contemplate the use of 21-in. diameter pony wheels and 28-in. diameter drivers, as it is likely that the motor dimensions can be reduced enough to permit the application of the smaller drivers. The relative arrangement of the trucks and body is practically standard, so that no special bolster arrangements are required, and wheel guards can be attached as on any other Brooklyn closed car. The electrical equipment is to include two Westinghouse 307 box-type motors, HL unit switch control, Westinghouse semi-automatic brakes with automatic couplers and two Nuttall No. 11 ball-bearing trolley stands. Illuminated routing signs will be located over the wide center cab sash and over the center doors. In addition, illuminated destination signs will be located in the top of the corner sashes.

25,000-KW ENGLISH PARSONS TURBINE FOR CHICAGO

The Commonwealth Edison Company, Chicago, has placed an order with Charles A. Parsons & Company, of Newcastle-on-Tyne, England, for a 25,000-kw turbo-generator for use in its Fisk Street station. The maximum rating of the machine will be approximately 40,000 hp. It is understood, unofficially, that the turbine will be a horizontal machine, the low-pressure end being of the double-flow type. The turbine is to be of the pure Parsons design, which is not made in this country. The generating unit will be 75 ft. long and 18 ft. wide, and ultimately three more will be installed in the enlarged Fisk Street station, which will then have a rating of 220,000 kw. The speed of the new unit is to be 750 r.p.m. The generator will be 25-cycle, three-phase, 4500 volts, with exciter on shaft. The arrangement of the condenser is entirely new. The auxiliaries are to be of the rotary type and electrically driven. It is said that the new generator units will take no greater floor space than vertical units of equal rating. By an ingenious rearrangement of boilers and economizers, no greater ground area will be required for additional steam-raising equipment, although extension of coal-handling machinery will be needed. The unit now under contract is to be shipped before the end of this year. The Fisk Street station supplies about one-third of the energy for the elevated lines and practically all of the energy for the surface lines of Chicago.

NEW RAPID TRANSIT LINE FOR BERLIN

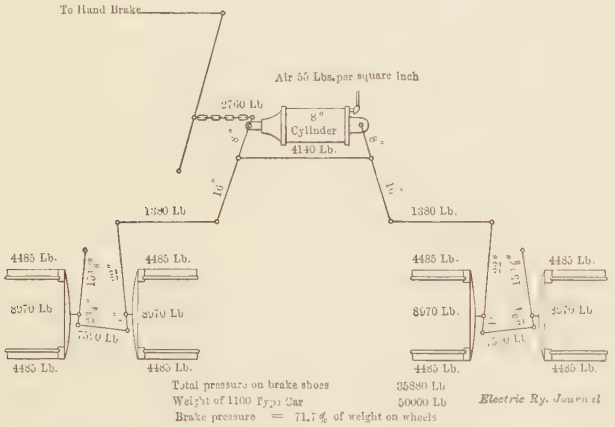
On Feb. 1, 1912, the Berlin (Germany) City Council concluded an agreement with the Allgemeine Elektricitäts Gesellschaft for the installation of an electric elevated and underground railway from Gesundbrunnen to Hermannplatz in Neuköln (Rixdorf). The railway, which will establish rapid transit between the two most densely populated parts of Berlin, and will have to deal with a passenger traffic of 50,000,000 to 60,000,000 persons annually, will cost more than $22,500,000, of which sum $21,250,000 must be furnished by the contractor, including the cost of a power station. The city of Berlin will make an additional allowance up to $1,475,000 for the construction of the southern section of the line as an underground railway. The length is 5.8 miles, of which about 1 mile is to be constructed as an elevated railway. Fourteen stations are provided. A departure from current Berlin practice is that the trains will carry cars of one class only. A three-minute headway will be used during the hours of heavy traffic. The price for a trip will be 2½ cents from any station to the fourth station beyond it, 3¾ cents to the eighth station and 5 cents for the whole distance. For the trains leaving up to 7 o'clock in the morning on weekdays, workmen's tickets will be issued at 3¾ cents to be available for the whole distance and also for the return trip on the same day. The line will meet a very pressing need in the traffic conditions of Berlin, particularly as regards the working population.

For heating water used for various shop purposes, the cheapest and most satisfactory arrangement consists of a steam jet rather than a steam coil. The objectionable noise caused when steam is turned direct into cold water may be overcome by using a double nozzle so that the escaping steam is surrounded by a rapidly flowing stream of water. These noiseless water heaters may be home-made or can be purchased in the open market.

A Comparison of Air-Braking Systems for Urban Electric Railway Cars

According to Data Recently Compiled in St. Louis, the Storage Air-Brake System Has Been Found Superior to the Individual Car Compressor System for the Conditions in That City

On Feb. 7 Charles W. Young and Charles A. Hobein, of the United Railways of St. Louis, read a paper on that company's air-brake installations before the St. Louis Section of the American Society of Mechanical Engineers. The authors compared straight air brakes of the individual car compressor and storage types from the standpoints of first cost, operation, maintenance and depreciation. In describing the parts common to both systems the accompanying leverage diagram was presented to show the final brakeshoe pressure on the St. Louis Type 1100 cars. The total braking pressure is 71.7 per cent of the weight on the wheels. It was noted by the authors that while this brakeshoe pressure seemed excessive from an engineering standpoint, it was necessary to make the force sufficient to slide the wheels. The brakeshoes are of cast iron with chilled inserts. They are good for 4000 miles to 5000 miles. Some wheel-truing



Braking Diagram of St. Louis Cars, Type 1100

brakeshoes are also used. The weight of the individual compressor equipment, including piping and hangers, but not including the truck equipment, is 1494 lb. per car. The compressors have 5-in. x 3-in. cylinders.

COMPRESSOR STATIONS OF STORAGE SYSTEM

There are eighteen compressor stations, but only seven operators are employed, since all operations were made automatic to avoid constant attendance. The station compressors are of the tandem-compound, single-acting type. They were built by the Ingersoll-Rand Company, and at 110 r.p.m. have a capacity of 100 cu. ft. of free air per minute, compressed to 300 lb. gage pressure. The cylinders are 14¼ in. x 6¼ in. x 12 in. and give a displacement of 115 cu. ft. at the speed mentioned. These cylinders are cooled by water, which is circulated by pressure due to the elevation of containing tanks. After leaving the compressor the water is elevated to the tanks by means of an air jet. The air is discharged into two 36 ft. x 18 ft. elevated tanks which serve as reserve supply, as the compressors were designed for intermittent service. The compressors were originally equipped for chain drive, but the upkeep on the chains was so great that belt drive was adopted. Every compressor has a pressure control device which consists simply of an ordinary pressure gage equipped with electrical contacts for starting and stopping the compressor. Another part of the station equipment is the unloader. This consists of two valves which are held open by a weight when the compressor is not driven. These valves open the high and low pressure cylinders to the atmosphere through a ½-in. pipe, thereby relieving the compressor of enough load to make it easy to start. The valves are closed by having a magnet lift the weight which holds them open.

SPECIAL CAR EQUIPMENT FOR STORAGE SYSTEM

The car equipment for the storage system consists of two high-pressure storage tanks 18 in. in diameter and 6 ft. long. These tanks are connected with a pipe to a cut-out cock and charging coupling. A reducing valve is interposed to maintain constant pressure in the service tank. The large tanks are suspended beneath the car, and, to prevent freezing, the reducing valve is placed inside the car underneath one of the seats. The other parts are common to both systems of air brakes. The weight of the complete equipment, including all hangers and rods, but none of the truck equipment, is 1295 lb.

A gage on the motorman's platform shows the pressure in the high-pressure tanks. Another gage, with two hands, indicates the service reservoir pressure and the cylinder pressure.

Table I.—Investments Required.

For Storage Air System:	
Real estate for compressor stations	$8,250
Compressor station buildings	30,800
Compressor station equipment	121,000
Car equipments, at $111.77 each, 1372 cars	153,348
	$313,398
For Individual Compressor System:	
Car equipment, at $323.47 each, 1372 cars	$443.800

COST CONSIDERATIONS

In adopting a system of air brakes there were several factors to be taken into account. One was the first cost, which is often the determining factor. Another was the total annual cost, and still another was reliability. The storage system of air brakes was adopted by the United Railways of St. Louis because it was considered superior from all of these standpoints, as shown by the figures presented in the five tables which follow.

Table II.—Maintenance of Storage Air System.

	Per Annum.	Per Car per Annum
For Car Equipment:		
Engineer's valves	$871	$0.634
Gages	301	0.219
Reducing valves	494	0.376
Brake cylinders	480	0.35
Power, live and dead levers	548	0.417
Brakeshoes	21,696	15.82
Cocks	1,223	0.932
For Compressor Station Equipment:		
Motors	201	0.146
Compressors	3,017	2.197
Hose	1,009	0.734
Labor	3,060	2.23
	$32,884	$24.055

NOTES ON TABLE I

Table I shows the investment costs of the two systems compared. The items for car equipments show the cost of all parts except the parts on the trucks. These are considered as parts of the trucks. In estimating real estate values the lots were estimated at the size necessary to care for a building to house the compressors, although most of the compressors are installed in the car sheds or repair shops. The buildings were figured from the cost of structures which have been put up for compressor stations.

NOTES ON TABLE II

All the values in Table II were obtained from the company's records of actual repairs made for some years back. The item for compressors in this table includes the cost of new chain sprocket wheels for the compressors. These

wheels were practically worn out when the machines were changed to belt drive. The cost was figured on a basis of their total life, and only one year's proportion is charged into this item. The item for labor is for the compressor station maintenance crew. Other items for labor have been added in the other costs where they occurred. By

TABLE III.—MAINTENANCE OF INDIVIDUAL COMPRESSOR SYSTEM.

	Per Annum	Per Car per Annum.
For Braking Equipment:		
Engineer's valves	$871	$0.634
Gages	301	0.219
Pump governors	27	0.02
Brake cylinders	480	0.35
Power, live and dead levers	548	0.417
Brakeshoes	21,696	15.82
Cocks	1,580	1.15
For Car Compressors:		
Motors	2,965	2.16
Compressors	8,279	6.03
	$36,750	$26.80

the use of belts a saving of $608 per annum will be made from the total cost as given.

NOTES ON TABLE III

The items of cost in Table III were obtained from records of repairs made for the individual compressor equipments of fifty-nine cars. The values were then expanded to cover the equipment of the entire rolling stock, comprising 1372 equipments.

NOTES ON TABLE IV

The items "energy for braking" were figured from the results of the tests made by the Electric Railway Test Commission in 1904 and published in its report in 1906. The commission found, on testing the two kinds of equipment on one of the 2200 type of cars, that the storage system required 2.25 watt-hours per ton mile for braking, while the individual compressor system required 1.27 watt-hours for the same service. This difference is due to the greater losses in the storage system.

The item "energy for transporting brake equipment" was calculated from watt-hour meter tests on cars, giving the watt-hour requirements per ton mile, estimating energy at the cars at 1.2 cents per kilowatt-hour, which includes operation, maintenance, fixed charges and losses, and then using the weights of the different equipments as found.

The item "costs of stops for charging" under storage

TABLE IV.—COST OF OPERATION OF THE TWO SYSTEMS.

	Per Annum.	Per Car per Annum.
For Storage System:		
Labor	$6,387	$4.65
Oil	710	0.517
Water for cooling compressors	9,900	7.20
Energy for braking	23,890	17.35
Energy for transporting brake equipment	38,849	28.30
Cost of stops for charging	25,000	18.22
Supplies	540	0.393
	$105,276	$76.63
For Individual Compressor System:		
Labor	$10,976	$8.00
Oil	1,358	0.99
Energy for braking	12,831	9.35
Energy for transporting brake equipment	44,830	32.60
Supplies	823	0.60
	$70,820	$51.60

system was estimated as follows: One-third of the car lines have charging facilities at the end of the lines and no charge is made for this. The stops were found by taking the miles run per charge and dividing the total mileage by it. Then 33⅓ per cent was subtracted, due to charging at the end of the line, and the remainder was multiplied by the time consumed in taking air. This gave the car hours consumed in taking air. As nearly all stops to take air are also used to take on or discharge passengers, it was considered only fair to charge the air system with the time in excess of that required in handling the passengers. Then the car hours required to take air were multiplied by the cost of a car hour, and the result was as shown.

NOTES ON TABLE V

In estimating depreciation as given in Table V, the different parts of the equipment were considered separately and the amount of depreciation in dollars per annum for each part was estimated. The sum of these amounts gave the total depreciation, which was then figured to a percentage basis. The factor of obsolescence, as based on experience, was also taken into account. The summary of Table V gives a comprehensive idea of the annual costs of the two systems.

MISCELLANEOUS

The authors also quoted from the report of the Electric Railway Test Commission as follows: "The electrical energy required to compress a cubic foot of air is 5.49 watt-hours in the storage system and 3.99 watt-hours in

TABLE V.—DEPRECIATION OF THE TWO SYSTEMS.

	Per Annum.	Per Car per Annum.
For Storage System:		
Car equipment, at 6.8 per cent per annum	$10,427	$7.60
Compressor stations, at 5.7 per cent per annum	6,897	5.02
Total for storage system	$17,324	$12.62
Individual Compressors:		
Car equipment, at 7.7 per cent per annum	$34,172	$24.90

the motor-compressor system, a difference in favor of the latter of 37.5 per cent. This results from the greater efficiency of the process of compressing the air directly to the pressure at which it is to be used. In the compression first to a high pressure, which is to be reduced to a lower pressure by expansion without useful return, a certain amount of work is done on the air which is absolutely lost. Further, in the compression of air to a high pressure a great deal of heat is generated. This heat is abstracted by the cooling water and is wasted. The efficiency of the large motors used in the storage system is much greater than that of the small motors, but this is an item of minor importance compared with the losses in the air.

"The difference between the electrical energy used for braking in the two cases shows practically the same advantage in favor of the motor-compressor system. * * * This follows from two causes: (1) The air is more economically compressed, and (2) the air is delivered more economically to the brake cylinders. The first of these items has already been discussed. The second is evident from the figures given for the volumes of free air used per car hour, per car mile and per ton mile. In the storage system more air is required from the fact that it is carried on the cars at a high pressure and leakage is difficult to avoid. This leakage occurs not only in the joints upon the cars, but at the time of charging the amount of air in the charging hose is wasted. * * * A horse-power minute of electrical energy will deliver 0.155 lb. of air in the storage system; this same energy will compress 0.228 lb. in the motor-compressor system, this saving resulting from the saving in the work done on the air in compression and not restored to it in expansion. * * * In deciding upon

TABLE VI.—SUMMARY OF COST OF THE TWO SYSTEMS PER ANNUM.

	Storage System.	Individual Compressor System.
Interest at 6 per cent	$18,803.90	$26,628.05
Taxes	3,463.20	4,906.00
Depreciation	17,835.97	34,172.66
Operation	105,376.60	70,820.11
Maintenance	32,884.92	36,750.52
	$178,264.59	$173,277.34

the system to be used in any case, therefore, the question at issue is whether or not there is a saving in interest and maintenance in the use of the storage system which will offset the greater efficiency following from the use of the other equipment."

The commission's tests in St. Louis brought out the fact that 95 per cent of the air compressed at the stations reached the cars. Both the motor and compressor efficiency was found to be about 88.3 per cent. The efficiency of the individual compressor system is about 75 per cent for the motor and 75 per cent for the compressor.

In concluding the paper, the authors acknowledged their obligations to M. O'Brien, master mechanic of the United Railways of St. Louis, for numerous facts and drawings.

REPORT OF NEW YORK COMMISSION ON ELECTRIC RAILWAYS

Information regarding electric railways under the jurisdiction of the New York Public Service Commission, Second District, is published in the fifth annual report of the commission, covering the year ended Dec. 31, 1911.

Attention is called to the fact that the record indicates that the transportation of property as freight or express is becoming a matter of importance to electric carriers. At the close of 1910 there were 218 effective schedules. This year shows 227 as being in force, an increase of nine. During the year eighty-seven tariffs were filed, effecting the cancellation of seventy-eight schedules. Examination of the changes made does not show increase in rates, but rather the provision of rates for shipment of articles not before carried as freight or express or the establishment of commodity tariffs providing reduced rates on specific articles.

Part of the report is devoted to the subject of street railroad inspection. It is stated that in the last three years less than 1 per cent of the accidents occurring on electric railways in the Second Public Service District were caused by defective track, roadbed or structures. A number of roads were examined during the last year and special attention was given to interurban roads. With the exception of some of the smaller roads on which only slow speed is made, the standard of maintenance is being raised, the report says, from year to year.

During the last year the companies generally have expended proper amounts for maintenance of way and structures. Several have made additions to depreciation fund for that account.

With a very few exceptions, all of the companies operating high-speed electric railways in the district maintain capable and efficient engineering departments. Heads of these departments have adopted standards of maintenance based on steam road practices. There was not a derailment on an interurban or suburban electric road in the district caused by defective track during the year.

There were no failures of bridges or structures during the year, and this is especially gratifying, the report says, in view of the number of street and highway bridges not originally designed for car service over which cars are operated at present.

More attention is given at present to car and equipment maintenance than in the past.

The report adds that the pay-as-you-enter car continues to increase in popularity with the companies and the general public. While it was found that the folding steps with which a number of these cars had been equipped retarded car movement in a slight degree, they reduced the number of boarding and alighting accidents to a minimum. The report says that the near-side cars introduced on the International Railway of Buffalo have not been in service a sufficient period to demonstrate fully their merits.

On the subject of car heaters the report says that discussion with several of the managers of electric roads justifies the prediction that the number of electrically heated cars will be reduced materially each year.

High-speed interurban roads are discussed and complimented for their successful operation. At certain times cars are run on these on very short headway, and on several roads the schedule speed between some stations is more than 50 m.p.h., while at times a speed of 60 m.p.h. is made. The report adds:

"The reports of the operations of these roads for the past year do not show a passenger or employee killed in collisions. This is a remarkable record and reflects great credit upon the managers and employees of these roads. This result is in a great measure due to the class of motormen and conductors employed and their faithful and proper performance of duties, to the efficiency and ability of the operating officials of the roads, and is in no small degree the result of improved methods of operation which this commission has been urging and requiring."

The rules for interurban operation adopted by the Street Railway Association of the State of New York are now under consideration by the commission. Their importance, the report says, is such that a very careful and thorough examination is being made before action on them is taken.

COMPANY SECTION OF AMERICAN ELECTRIC RAILWAY ASSOCIATION ORGANIZED AT MILWAUKEE

Company Section No. 1 of the American Electric Railway Association has been formed by The Milwaukee Electric Railway & Light Company. This section has been created as the initial step in a movement which it is planned to make of great importance.

The idea of company sections for the American Electric Railway Association was advanced by retiring President Brady in his address at Atlantic City last October. The new president, Mr. McCarter, appointed a committee to consider this and other recommendations relating to the work of the association. The committee consisted of C. N. Duffy, of Milwaukee; Richard McCulloch, of St. Louis, Mo., and Mr. Brady. This committee made a report to the executive committee of the association at the midyear meeting in New York in January, recommending the formation of such sections to be composed of employees of member companies. Its report was approved. One feature of the report provided that for the purpose of promoting the formation of such sections a sub-committee of the committee on associate membership should be appointed, to be known as the company section committee. President McCarter has appointed Mr. Duffy chairman of this committee, but the full membership has not yet been announced.

The Milwaukee Electric Railway & Light section of the association was organized at a meeting held in the Public Service Building in Milwaukee on March 18. A constitution was adopted and the following officers were elected: President, C. N. Duffy; vice-president, F. G. Simmons; secretary, H. A. Flertzheim; treasurer, W. W. Hunzicker, all of whom are elected to serve for one year; directors, Paul Klabunde, to serve for three years; A. J. Killa, to serve two years: I. H. Glendenning to serve one year; R. B. Stearns, director ex officio.

The members are as follows: M. M. Austin, F. V. Benz, Hans E. Birkholz, Carl Blixt, C. K. Boas, John Boden, E. M. Brown, C. O. Davis, C. N. Duffy, E. J. Evans, J. C. Fitzpatrick, H. A. Flertzheim, Orville Flint, Willard Flint, I. H. Glendenning, Fred Goetz, H. Halvorsen, A. W. Hoehne, W. W. Hunzicker, A. J. Killa, P. W. Klabunde, George Kleczka, G. Kuemmerlein, Jr., Charles F. C. Lederer, Dr. C. H. Lemon, F. A. Luber, A. R. MacLaren, A. Meisenheimer, J. D. Mortimer, H. A. Mullett, Gust Naatz, J. W. Overholt, C. W. Peterson, O. Peterson, R. H. Pinkley, M. S. Rausch, C. P. Riegle, H. F. Scheife, F. G. Simmons, G. F. Staal, R. B. Stearns, Erich C. Sternkopf, C. H. Thornberry, Joseph Thorp, A. E. Wallace, E. D. Whitcomb, J. E. White and William Wolff.

A section of the constitution states the object as follows:

"The object of this association shall be to foster and promote the common interests of its members and to advance scientific and practical knowledge in all matters relating to the electric railway industry; also to establish cordial and beneficial relations with kindred associations and between the members of this section."

Two standing committees are to be created, a program committee and a membership committee. These are to be appointed by the executive council, which consists of the officers and directors. Meetings are to be held on the evening of the first Thursday of each month except July and August.

RAILWAY ROLLER BEARINGS*

BY JAMES N. VANDEGRIFT, VICE-PRESIDENT AND GENERAL MANAGER RAILWAY ROLLER BEARING COMPANY

In the electric railway field we have passed through twenty or more years of extraordinary and hurried work in the construction and equipment of city systems and interurban lines. Now as the problem becomes one of refinement in engineering and in car equipment, the progressive manager is looking for increased mechanical efficiency and durability as a means of reducing operating expenses and maintenance.

In this connection the greatest opportunity is presented in eliminating or reducing friction. In comparatively slow-speed city service, head-end air resistance is relatively a small factor. Motor and gear transmission efficiency may be somewhat increased by means of anti-friction bearings to maintain the armature central within the field and without the variation and losses in meshing of gears due to wear of bearings. No great reduction in railway motor or rheostat losses appears to be available at this time.

CAUSES OF FRICTION

In the operation of an ordinary double-truck electric car we find friction developed chiefly as follows:

(1) The pressure from gravity of the car body, the load and part of the motor and truck equipment upon the axle journals.

(2) The torque or thrust of the motor, which may vary in direction and distribute motor-bearing friction through a larger arc of bearing in armature and axle motor housings than in the case of the axle journal box where the direction of gravity pressure is constant.

(3) The centrifugal thrust of the car at a tangent and in a horizontal plane on curves, as manifested in the end thrust of journal and motor bearings, wheel flange friction and wear on the inside of the rail head.

(4) The wear and corrugation of the top of the rail head due to slippage of wheels fixed on a rotating axle in rounding curves, also the slippage and wheel flange wear on straight track where the two wheels fixed on one axle are not uniform in diameter.

(5) Friction due to the radial action of trucks on curves, expressed at the center plate and side-bearing plates where the weight of the car body engages the truck bolster.

(6) Friction applied by brakes upon the tires of the wheels in an approximately horizontal direction with resultant pressure in axle journal bearings.

In ordinary railway operation, even in plain journal city car service with frequent stops at street crossings, power is ordinarily applied to the car during only 50 per cent of the running time, so that motor and rheostat losses are not a factor for one-half the time. This leaves journal bearing, flange friction and braking as the chief retarding elements except, of course, where grades are to be negotiated. The importance of an organized effort to solve the whole problem of friction in railway transportation becomes evident when we reflect that by eliminating axle journal friction alone the car will coast, without power, over 30 per cent more of the running time in city service and gain 50 per cent to 60 per cent in time coasting on subway and interurban runs.

TYPES OF ANTI-FRICTION BEARINGS

During the many attempts in recent years to solve the problem of anti-friction bearings for railways practically all types of bearings previously used for other purposes have been tested. Annular ball bearings, tapered rollers, solid cylindrical rollers and hollow spiral cylindrical rollers have all been tried. The characteristic feature of our company's development work, however, has been the introduction of a solid short roller of relatively large diameter which is entirely relieved from end thrust duty.

The ball for heavy duty in car axle journals where the weight is imposed on not more than one-fifth of the balls in the series develops with its point of contact a scouring of the grooved raceway which is accentuated where the balls combine end thrust with radial duty. When the raceway is worn the work is often imposed upon only one ball of the series, a condition which results in splitting the ball in a plane connecting the two points under pressure, followed by the breakage of the ball retainers and complete failure of the bearing parts.

The tapered roller, which has been successful in automobile work for relatively light duty combining both radial and end thrust, has made no progress in the railway field. Under heavy pressure the tapered roller is wedged outward. This results in a scouring of both roller and raceway surfaces and requires adjustments for wear which render it impracticable in railway service, regardless of the questions of durability and efficiency.

The hollow spiral roller, like the tapered roller, requires an aligning cage, thus introducing a delicate breakable part with an element of danger. The hollow spiral roller also has a tendency to compress out of a true circle under heavy load and to elongate so that the ends of the rollers scour the sides of the raceway.

The solid roller of comparatively great length in proportion to diameter has the advantage of line contact with the raceways. With accurate workmanship it may be made to operate successfully under heavy loads under certain conditions. Unless the raceways are maintained true, however, the rollers are apt to break or twist diagonally. This is particularly true of the rollers of relatively small diameter where the carbonizing of the roller removes the soft, tough core which is essential to withstand crushing and diagonal strains. In standard truck frames the pedestal jaw openings are not wide enough to allow the introduction around the axle journal of rollers of sufficiently large diameter for service requirements.

The design of our bearing proceeded from the simple toward the complex only far enough to insure the desired result. Failures in roller journal operation in the past have ordinarily resulted from one or more of three causes, namely, the crushing strains under heavy loads and blows upon the surfaces of the metals in rotating members and raceways, resulting in crystallization and fractures; the diagonal twisting and jamming of rollers in operating around curves, and the troublesome end thrust.

The use of balls to solve the last-named difficulties has been repeatedly tried. A series of balls where the load is distributed equally upon all the balls is found adequate for the comparatively light end-thrust purposes; but for radial work in journal boxes, where the weight of the loaded car in pounding over frogs, crossing and rail-joints is applied to only two or three rotating members of an annular series, the broad lineal contact of the large diameter roller with its raceway like a large wheel with a broad tread is essential to durability.

Any anti-friction rotating member, whether ball or roller, upon which is imposed the double service of radial and end thrust duty, necessarily shifts frequently its opposing points of pressure from out of a vertical line, and sets up a scouring action in addition to crushing strains at its point of contact with the raceways. The balls or rollers carrying the load should by a suitable anti-friction device be relieved entirely of end-thrust duty.

Not only is the large diameter roller essential to durability, but in a railway roller bearing there must be no delicate, breakable or complicated parts which involve expensive renewals and frequent adjustments. In other words, there must be no short-lived features if the bearing is to be a success.

* Abstract of an address delivered before the Technology Club, Syracuse, N. Y., March 6, 1912.

INSTALLATIONS OF ROLLER BEARINGS ON CARS

In November, 1909, the eight original short-roller journal boxes were transferred to Philadelphia, Pa., for demonstration and the following month the president of the Philadelphia Rapid Transit Company placed an order for twenty double-truck cars to be equipped with roller journals of this type. This is said to be the first equipment order ever placed for roller-bearing journal boxes by any railway system. Part of these boxes were installed in old trucks and part in new trucks. The bearings which operate in the new trucks are still in excellent condition, but the old truck frames were more or less flexible and threw the ball thrust out of contact with the end of the axle from time to time. The thrust then came on the ends of the rollers. To avoid this with the single thrust type of bearing the thrust nuts should have been adjusted every four or six months. This was not done nor is it likely to be looked after in ordinary service. It became evident that to make the box commercially successful the end thrust should be positively taken care of at all times, and that no adjustments should be required after the roller journal boxes were placed in regular service either in old or new trucks.

In October, 1910, we placed in service a roller-bearing car wheel which had been previously designed to rotate on a fixed axle. In this installation an end thrust device was employed which absolutely prevented endwise movement of the wheel and rollers in either direction along the axle. It consisted of a double-grooved ring held in the hub at the outer cover and thrusting a series of balls inwardly against the end of the journal sleeve and outwardly a series of balls against a raceway and nut securely locked at the end of the axle journal.

This bearing, embodying a double series of short rollers of relatively large diameter in combination with the double ball thrust above described, was then adopted and has proved uniformly successful in nearly 500 installations. They now operate on twenty-eight American or foreign systems in all classes of electric railway journal service ranging from the light storage battery car with not over 3000 lb. of load per journal to the heavy Baldwin electric locomotive with 5-in. x 9-in. journals carrying a maximum of 12,000 lb. each. The Third Avenue Railroad Company, New York, operates fifty-six cars equipped with journals of this double thrust type. As no defects or evidences of wear or roller diameter reduction have developed in a single instance after nearly a year's service, it would appear that this type of bearing must be accredited with reliability as well as efficiency.

In Maine an interurban line operates this double-thrust roller journal in high-speed service, making 330 car miles a day at a maximum speed of 50 m.p.h. After a year's service covering 85,000 miles, the micrometer shows no reduction of roller diameter or wear of raceways. This type is shown to be more nearly frictionless than any other thus far produced, as both radial and end thrust friction have been practically eliminated by a separate series of anti-friction members for the separate duties of radial and end thrust. Other evidence of the frictionless quality of the bearings is shown from the fact that they were operated on car axle journals on the Erie Railroad for a period of six weeks, covering over 3200 miles, without oil or other lubricant. Similar dry tests have been equally successful in motor bearings of this type operating at 900 r.p.m. for a period of one week in continuous shop work without developing any temperature in the bearings or abrasion of the roller or raceway surfaces. It is not recommended that the bearings should be operated without lubricant in any class of service, but there is a sense of security in a bearing which does not develop trouble or damage the moment it becomes dry and which requires only a small amount of lubricant two or three times a year despite the exacting conditions of street railway service.

SAVINGS TO BE EFFECTED BY ROLLER BEARINGS

Briefly, a double-truck roller-bearing car in city service with frequent stops shows an average saving of 18 per cent energy over plain journals where no instructions are given to motormen to take advantage of the coasting opportunity afforded by roller journals. When the motorman does take full advantage of coasting, the saving in energy has been increased from 18 per cent to 32 per cent on the same car in the same service. As it is not to be expected that all the motormen, even when so instructed, will take full advantage of the opportunity for roller coasting, the average energy saving will approximate 25 per cent.

Roller journals need lubrication at intervals of four to six months with an average total of 6 lb. of non-fluid oil per journal per annum, or an average saving of 80 per cent of the cost of plain journal lubrication. A summary of the comparative costs of roller and plain journal operation and maintenance based on a life of five years for roller journals follows:

Annual Expense for Roller Journals of a Double-Truck Car, Total Weight 48,000 lb.

Reserved for box renewals at end of five years	$12.40
Reserved for bearing renewals at end of five years	52.00
Cost of lubrication and attendance	4.00
Total annual charge per car	$68.40

Annual Expense for Plain Journals of the Same Car.

Plain boxes	$5.12
Brass (life 40,000 miles)	9.50
Lubrication and attendance	14.00
Total	$28.62
Increased cost of roller over plain journals for five year period,	$39.78.

Power Consumption Based on 35,000 Car Miles per Annum.

For plain journals, 3.25 kw-hr. per car mile, at 1 cent	$1147.50
Roller journals, 2.43 kw-hr. per car mile, at 1 cent	850.50
Annual saving in power for roller journals	$297.00
Excess annual charge for roller journals	39.78
Net annual saving per car for roller journals	$257.22

The foregoing figures do not include the reduced cost of wheel maintenance due to the lessened flange wear which is obtained by eliminating the side sway in old trucks after installing roller journals, nor does it take into consideration the greatly reduced demand on the motors for current with reduction in overheating, motor maintenance and renewal costs. No reliable data are available as yet for these items, but they will doubtless bring the net annual saving due to roller journal operation to approximately $300 per car per annum, or a saving of nearly 1 cent per car mile of operation in regular city service.

In high-speed interurban service with 70,000 car miles to 80,000 car miles per annum, the saving due to roller journal operation will approximate $600 to $700 per car per annum, or nearly double the interest on the cost of the entire car including truck and motor equipment.

Even with these extraordinary economies in operation available, there is sometimes a hesitation to add to the capital account of the railway company the initial increased cost of roller over plain journals. It has been conclusively shown, however, that in ordinary service in connection with roller axle journal operation the motors installed may be of 20 per cent to 30 per cent less rated horse-power than would be required with plain axle journals. This means a reduction in cost of motors equal to the increased first cost due to roller journals.

THE ROLLER-BEARING CAR WHEEL

The roller journal box practically eliminates radial and end thrust journal friction, but the roller-bearing car wheel, which operates on a fixed axle, makes a formidable attack upon additional items in the list of friction elements in car operation previously enumerated. It practically eliminates journal friction and greatly reduces wheel flange friction on curves as well as straight track with reduction in the wear of rails and corrugation of the rail heads due

to wheel slippage. Tests on Beach-Edison storage-battery cars show a 34 per cent saving in energy consumption, or increase in the mileage of one charge for roller journals over plain journals. The first motor-driven roller car wheel was designed by the writer in 1903 and later made by our company and installed on a Beach-Edison battery car. Tests on these wheels, however, show a saving of 51 per cent in power over plain journals. The double-truck Beach-Edison storage-battery car weighing 30,000 lb., equipped with the first roller car wheels, holds the world's record for low-energy consumption of 43 watt-hours per ton mile. This is a service record made at Orange, N. J., over maximum 2 per cent grades at 9 m.p.h. schedule speed with an average of seven stops per mile. The roller journal has given to the storage battery car the additional mileage on one charge of the battery which was necessary for commercial success.

OPERATING CHARACTERISTICS OF CARS WITH ROLLER BEARINGS

It may be of interest to mention some of the notable characteristics of roller-bearing car operation. A roller-journal car never starts with a jerk—if the brakes are properly released when the power is applied. The passenger is not jolted or thrown off his feet. In like manner, the car makes a soft, easy stop, as there is no play of the axle in the journal box with loss of brake pressure. The car accelerates quickly and the power may be shut off and, unless grades are encountered, coasting may begin as soon as the car attains running speed. The car starts with only one-fourth of the current ordinarily required with plain journals and will accelerate at a given speed with one-third less power, thus greatly reducing the peak load on the motors as well as on the power plant. As will be later shown, there is no corresponding loss of power in braking or deceleration. An important feature is the free coasting around curves made possible by the frictionless journal end thrust and the absence of side swaying of the car.

ARMATURE BEARINGS

The operation of roller bearings on armature shafts of railway motors is a comparatively recent development. The first installed by our company in regular service was placed on Nov. 14, 1911, on a GE-216, 50-hp box-frame motor of the Syracuse Rapid Transit Company's prepayment car No. 764. A few days later two 150-hp motors with roller bearings were placed in regular elevated railway service in New York. No inspection has been made of any of these bearings since they were placed in operation. While it is perhaps too early to draw a comparison of operating economies, we know that approximately 3 per cent of the energy input is saved and that the bearings will need lubrication not more than once or at most twice a year. These bearings will also eliminate the danger of damage to field and armatures due to the wear of plain bearings. Inspection once a year, as in the case of roller bearings for induction motors, will doubtless prove ample. We are confident that for both railway motor and industrial motor purposes a bearing with rollers of the twin separated type has been produced which will last as long as the motor itself.

CAR BRAKING

It will be observed from what has been already stated that, except in braking, a serious attempt has been made to eliminate or greatly reduce friction at every point where it now retards car operation. As yet no practicable substitute for friction has been offered to stop the car. Until it is forthcoming we would recommend that a seat for a detachable drum be cast or rolled inside the web of the wheel and made nearly as large in diameter as the wheel. Now that the roller wheel shows that it is possible to reduce flange wear greatly, it would also be advantageous to have the brakeshoes applied elsewhere than upon the tires so that full advantage could be taken of the possible saving in wheel maintenance.

CAMBRIDGE SUBWAY OPEN TO TRAFFIC

The Cambridge subway of the Boston Elevated Railway Company's rapid transit system was thrown open to traffic at 5.24 a. m. March 23, when the first train carrying revenue passengers left Harvard Square, arriving at Park Street, Boston, in slightly under eight minutes. The train carried 306 passengers, including a number of officials of the company headed by Matthew C. Brush, second vice-president. Actual work was begun on the section of the subway within the city of Cambridge in July, 1909, work on the Boston connection being commenced in September, 1909. The Boston Elevated Railway Company built the Cambridge section, and the Boston connection was built by the Boston Transit Commission. The total cost of the entire work was $11,750,000. The company estimates that seventeen days of ten hours each will be saved every year to every person riding twice daily through the subway, the cost per minute saved being $688,000. The company points out in a bulletin issued on the opening date that prior to the construction of the new subway there was already invested in the surface lines $4,000,000 in Cambridge, that $4,000,000 more is being expended on the East Cambridge extension over the Charles River dam, and that there will shortly be a total investment of $19,750,000 for Cambridge transportation, or a total of $1,400 for every dwelling house in the city. The entire taxable value of all the property in Cambridge is only 4.5 times the street railway investment. The company states that no community in the world has an equal investment per inhabitant or an equal investment per dollar of wealth.

The establishment of fast service to and from Harvard Square was immediately felt by the Boston suburbs lying to the west of the Charles River. The company inaugurated a system of inter-suburban surface car routes with the opening of the subway, the Harvard Square station being included. At the latter point free transfers were given without checks between surface cars entering the station and the subway trains in each direction. Similar transfer is given between subway trains at Park Street and cars moving north and south in the Tremont Street subway, and also between the trains and surface cars at Kendall and Central Squares. Besides the reduction of seventeen minutes effected by the new subway in the running time between Harvard Square and Park Street a corresponding saving in time is made between the outlying suburbs of Waverley, Arlington, Belmont, Waltham, Watertown and Newton and the heart of Boston. A typical run from Park Street to Harvard Square, a distance of 3.2 miles, is given below:

	Min.	Sec.
Park Street, Boston, to West Portal Beacon Hill tunnel, 2486 ft...	1	14
Park Street, Boston, to Cambridge Bridge, 3164 ft.....	1	35
Park Street, Boston, to Cambridge subway entrance, 5562 ft.....	2	26
Park Street, Boston, to Kendall (Square) station, 6700 ft.....	2	53
Park Street, Boston, to Central (Square) station, 11,780 ft.....	5	2
Park Street, Boston, to Harvard (Square) station, 17,224 ft.....	7	34

As previously described in this journal, the cars used in the Cambridge subway are the largest which have ever been placed in service in Boston. They cost about $12,000 each and are 69 ft. 2⅛ in. long, with three doors on each side to provide for rapid loading and unloading. The trains consist of from two to four cars each and are operated upon a three-minute interval the greater part of the day.

The electric express railway projected between Cologne and Düsseldorf is to serve the passenger traffic between the two cities named. At first a 20-minute service will be established, but it is intended to increase this later to a 10-minute service. The course chosen is the left bank of the Rhine, the river near Düsseldorf being crossed by a bridge. The track is to be 22 miles long, exclusive of 3 miles within the city limits of Cologne and Düsseldorf.

WOODEN POLE STATISTICS FOR 1910

The Department of Commerce and Labor has issued Forest Products' Bulletin No. 9, giving statistics concerning wooden poles during 1910. The numbers of poles of various kinds of wood used during the year are shown in the following table:

TABLE SHOWING POLES PURCHASED, CLASSIFIED BY KINDS OF WOOD: 1907 TO 1910.

Kinds of Wood.	1910.	1909.	1908.	1907.
Cedar	2,431,567	2,439,825	2,200,139	2,109,477
Chestnut	677,517	608,066	516,049	630,282
Oak	265,290	236,842	160,702	76,450
Pine	184,677	179,586	116,749	155,960
Cypress	75,459	77,677	90,579	100,368
All other	236,184	196,744	164,936	210,731
Total	3,870,694	3,738,740	3,249,154	3,283,268

The demand for wooden poles, now amounting to nearly 4,000,000 annually, is supplied principally from three different sections of the United States, the northern white cedar region of the lake states, the chestnut region of the eastern portion of the United States, and the western red cedar region of the Northwest, including Idaho, Washington and Oregon. Southern white cedar, or juniper, is found mainly in North Carolina, Virginia and New Jersey. At present the largest part of the cedar used is cut in the lake states, but the indications are that the Northwest will be called upon to supply a constantly increasing proportion.

The number of oak poles purchased shows a heavy increase throughout the period covered by the table, the number purchased in 1910 being more than three times that reported in 1907. Various species of oak are utilized in different parts of the country, the more durable varieties of the white-oak group being preferred. The number of pine poles has shown a slight increase for each year except 1908. Several species of Southern yellow pine are used to considerable extent, principally in the Southern States. In the West another species, the Western yellow pine, is reported. The latter is seldom used for poles without preservative treatment.

The number of cypress poles purchased seems to be falling off, the number reported for 1910 being only about three-fourths as great as in 1907. Cypress poles are cut only in the Southern States, mainly in Arkansas and Missouri. The use of Douglas fir in the Northwest is growing rapidly. Over 56,000 Douglas fir poles were reported in 1910, as compared with about half this number in 1909 and less than 16,000 in 1907. Poles of several other kinds of woods were purchased in quantities of less than 50,000, of which tamarack, redwood, osage orange, spruce and juniper were the most important.

The telephone and telegraph companies, which are the principal consumers of poles, reporting 73.2 per cent of the total number used, purchased 84,195 fewer poles in 1910 than in 1909. The electric railroad and electric light and power companies, on the other hand, purchased 105,678 more poles than in 1909, while the steam railroad companies purchased 110,471 more poles than in the preceding year.

More than one-half of the poles purchased are from 20 ft. to 30 ft. long, this being the length most commonly used by the telegraph and telephone companies. About one-fifth are from 30 ft. to 40 ft. in length and one-twentieth from 40 ft. to 50 ft. Only about 1 per cent of the poles purchased exceed 50 ft. in length. Cedar was the preferred wood for all lengths, and, in fact, in every class shown in the table, except that of poles less than 20 ft. in length, cedar poles constitute more than one-half of the total. Poles of less than 20 ft. in length are used largely by the rural telephone companies, which report a considerable variety of woods, prominent among which is oak.

The increase from 1909 to 1910 in the total number of poles purchased was 3.5 per cent. The largest increase for any of the several classes was that for poles over 50 ft. in length, 23.5 per cent, and the next largest that for poles from 40 ft. to 50 ft. in length, 16.9 per cent. A slight decrease is reported for poles from 20 ft. to 30 ft. long.

PRESERVATION

The great waste occasioned by the rapid decay of woods when in contact with the soil is very apparent in the case of poles, and it may be stated that it is possible, through the proper application of certain preservatives, to increase the life of a pole from 50 to 100 per cent. The practice has proved a success economically. Not only does it lengthen the life of the pole, but it makes possible the utilization of many cheap local woods which without preservative treatment would be valueless for the purpose, thus reducing the cost of poles and transportation charges. In the principal European countries the practice of pole preservation is much more common than in this country, nearly every pole receiving a penetrating treatment with some preservative before being set. The economy of the process has been so well established that as it becomes generally understood the percentage of treated poles reported in the United States will no doubt rapidly increase and the methods used become more effective each year. The preservatives most commonly used are creosote oil, a solution of zinc chloride and various proprietary preparations, usually antiseptic oils of low volatility.

The increase in the practice of really effective pole preservation in the United States has been retarded by the lack of pole-treating apparatus applicable to the needs of the small consumer. As a result, poles have been treated mainly by methods which do not require the use of a special treating plant and which add but few years to their service. The usual method is that of painting the lower end of the pole with the preservative.

A somewhat more effective method is that of dipping the pole in an open tank containing the preservative. By this operation all seasoning checks are thoroughly penetrated. A variation of this method is to stand the poles upright in a bath of the preservative, making the wood of the butt end of the pole decay-proof by the absorption of large quantities of the oil or solution, through the action of a partial vacuum in the wood cells treated by the alternate raising and lowering of the temperature of the bath. Satisfactory plants have been devised for this purpose which are economical for firms using considerable numbers of poles annually. A plant of this type and of large capacity was built during the year in California for the treatment of Western yellow pine, Western red cedar and other local woods.

In 1910 some form of preservative treatment was administered to nearly 825,000 poles, or 21.3 per cent of the total number purchased. This is an increase of 248,000 over the number treated in 1909, and of 480,000 over the number treated in 1908.

By far the larger part of the treated poles were treated after purchase, the increase in the number treated after purchase during the past few years being much more rapid than that in the number treated before purchase. The electric railroad and electric light and power companies have been especially active in pole preservation. These companies treated nearly 30 per cent of their poles, while the telephone and telegraph companies and the steam railroad companies each treated less than 20 per cent of their poles. These percentages indicate a large gain for each class of the purchasers except the steam railroads, which treated 31.1 per cent of the poles purchased by them in 1909.

Although some of these poles were treated with a solution of zinc chloride, by far the larger part were impregnated with creosote oil, from 6 lb. to 20 lb. being used per cubic foot of timber.

The Long Island Railroad operated a total of 18,671 trains during February, 1912, and 95 per cent of them were on time or not more than five minutes late.

GOVERNMENT MAIL SERVICE ON ELECTRIC AND CABLE CARS

The report of Joseph Stewart, Second Assistant Postmaster-General of the United States, covering the year ended June 30, 1911, has been sent to the Postmaster-General. It gives the following data regarding electric and cable car service during the year as compared with the previous year:

Service and Expenditure.		Increase Over Previous Year.	Per Cent.
Number of routes	547	8, or	1.484
Length of routes, miles	7,347.44	149.90, or	2.082
Annual travel, miles	11,525,267.47	*104,384.68, or	0.897
Annual rate of expenditure	$681,073.72	$7,243.46, or	1.074
Average rate of cost per mile of length	$92.69	*$0.92, or	0.982
Average rate of cost per mile traveled, cents	5.91	0.12, or	2.072
Average number of trips per week	15.08	*0.45, or	2.897

*Decrease.

Continuing, the report says: "The appropriation for the fiscal year was $720,000; the amount expended, as reported by the auditor, to Sept. 30, 1911, was $688,953, leaving a balance of $31,047, out of which unsettled accounts must be paid.

"The appropriation for the fiscal year 1912 is $725,500. The annual rate of expenditure was: July 1, 1911, $681,418; Sept. 30, 1911, $682,742.

"The sum estimated as necessary for the fiscal year ending June 30, 1913, is $734,000, being $8,500, or 1.17 per cent, more than the appropriation for the previous year.

"In accordance with the provision of law allowing the maximum rates of compensation to be paid for electric and cable car service, readjustments made during the fiscal year slightly decreased the annual rate authorized under this provision. The annual rate authorized under this provision for the entire service on June 30, 1911, was $324,571, being at the rate of $93,443 per annum in excess of the electric car rates otherwise payable.

"The act making appropriations for the fiscal year of 1912 includes a provision that not exceeding $15,000 of the sum appropriated may be expended, in the discretion of the Postmaster-General, where unusual conditions exist or where such service will be more expeditious or efficient and at no greater cost than otherwise. Under this provision the total annual rate of $8,564 has been authorized, there being no change from the total authorization reported for the preceding fiscal year. The estimates for the next fiscal year include a like provision appropriating $15,000.

"The appropriation act for the fiscal year 1912 continued a provision in connection with the item for electric and cable cars authorizing the expenditure of not exceeding $100,000 of the appropriation for regulation screen or motor wagon service, which may be substituted in lieu of electric and cable car service. This could not be done otherwise on account of the fact that the appropriation for regulation screen-wagon service is generally no more than sufficient to care for existing contract obligations and increases in service which are foreseen. It has not been found necessary to make use of this authority, but it is a valuable alternative to enable provision for service in cases where the demands of electric car companies in the performance of the service in the large cities cannot be met, and it should therefore be continued."

Railway post office service was furnished during the year on 665.47 miles of electric car lines, a decrease of 2.371 per cent as compared with the preceding year. The total number of miles of service during the year was 663,453, an increase of 6.145 per cent. Closed pouch service was furnished during the year on 6392.51 miles of electric lines, an increase of 3.149 per cent as compared with the previous year. The annual number of miles of service was 9,026,821, a decrease of 1.201 per cent as compared with the year ended June 30, 1910. The number of mail cars in operation on June 30, 1911, on electric and cable lines was twenty-five, the same as one year previous.

INTERURBAN CARS FOR DETROIT UNITED RAILWAY

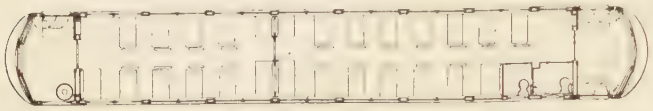
Accompanying illustrations show one of the four 58-ft. limited cars which have been shipped by the Niles Car & Manufacturing Company to the Detroit United Railway. A plan of the car is shown on page 512. These cars are of the most advanced design in view of their application for through service between Cleveland and Detroit. This route extends for 177 miles through Toledo, Monroe, Fremont, Sandusky, Norwalk, Lorain and numerous other places in Northern Ohio and Southern Michigan. The running time is about six hours, which corresponds to a schedule speed of nearly 30 m.p.h. The cars will be fitted with four 110-hp motors, geared to 60 m.p.h., and automatic air brakes with automatic M. B. C. couplers for train service around 35 ft. radius curves. Great care has been taken in arranging the buffers and couplers, because at the curvature men-

Interior of Detroit Interurban Car

New Interurban Car for Service Between Cleveland and Detroit

tioned the cars stand at an angle of 76 deg. to each other. The buffers are equipped with Hedley anti-climbers and bevel hoods.

In designing this car, the railway officials made no attempt to economize in seating capacity since ample room and comfort for the passengers were the main considerations. As an instance of this policy, it may be mentioned that the distance between the seat centers is 45½ in. or about 3 in. more than is usual between seats in electric cars. The smoking partition door is off center with a single seat at one side in order to provide ample room on the opposite side. The seats in the main compartment are upholstered



Plan of Detroit Interurban Car

in embroidered green plush and in the smoking compartment with genuine dark green leather. The ceiling is of the semi-empire type in green and gold with lamps placed in clusters along the center line of the ceiling. The gothic windows have double sashes and are glazed with leaded cathedral glass. The deck sashes are stationary and are fitted with automatic ventilators. The trimmings are statuary bronze finish. There are two saloons with water flush hoppers, the one for women being also equipped with a lavatory. A hot-water heater is in the front vestibule.

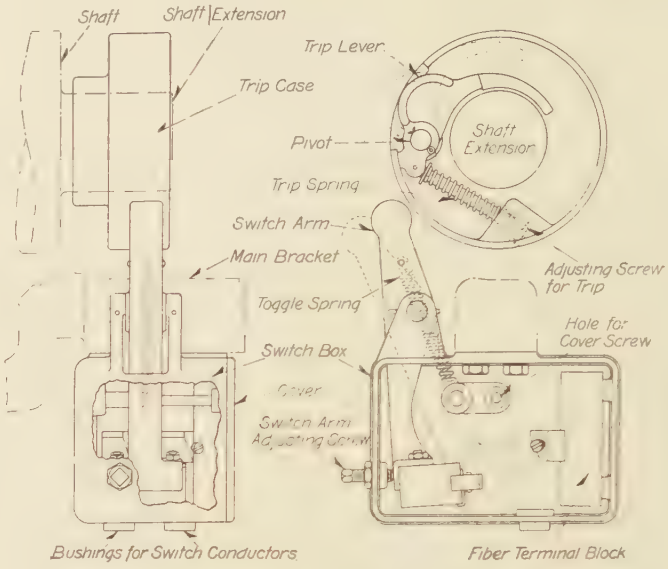
NEW OVERSPEED LIMIT DEVICE

A new overspeed limit device for rotary converters and motor-generator sets has been developed by the Westinghouse Electric & Manufacturing Company, and will be furnished on all Westinghouse rotary converters built in the future and, when especially ordered, on motor generators. The operation of the mechanism is shown herewith. Normally the trip lever is held in the position shown in full lines by the trip spring. If the speed of the machine exceeds the value, usually 15 per cent overspeed, for which the device is set, the trip lever, owing to its centrifugal force, flies outward positively and quickly and, knocking over the switch arm, closes the switch. An important point in connection with its action is its positiveness. If the trip lever starts to fly out, the speed remaining constant or increasing, it will continue until it strikes the stop. This action is due to the proportions and disposition of the trip spring and the trip lever. The point on the trip lever that strikes the switch arm is approximately at the center of percussion of the lever, a fact which insures an effective blow being struck by the lever. Normally the switch arm is held in the open position by a toggle spring. The relation of the spring to the lever is such that the resisting torque of the spring is a minimum. When the trip lever strikes the switch arm it forces the arm past the center point of the toggle mechanism and the switch, under the spring's tension, closes of itself.

It is only necessary for the trip lever to move the arm a small distance, possibly 3/32 in., to insure that the switch will close. The relation of the parts is such that when the arm is in the closed position the contacts are forced against the contact blocks with considerable pressure—much more pressure than is required to trip the switch. To reset the switch it is merely necessary to move the switch arm back to the normal position by hand. This can be readily done at any time whether the machine is running or not and without opening the switch box.

That very few parts are involved is evident from an inspection of the illustrations. The minimum diameter for any bearing pin is ½ in., and the other parts are correspondingly strong. Adjusting screws are provided whereby the position of the trip lever can be closely regulated so that it will act at the predetermined speed. The sensitiveness of action of the switch arm can also be regulated by an adjusting screw.

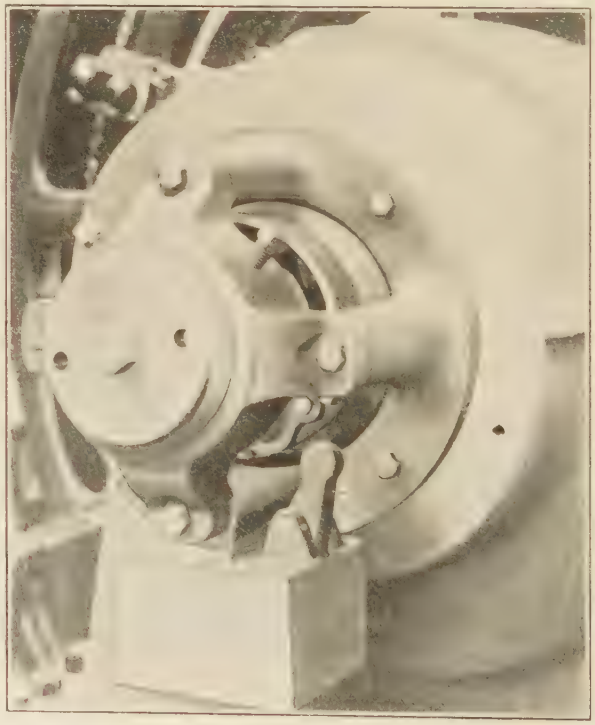
Electrical connections for the new device will be the same as those used for the former Westinghouse standard



Assembly Drawing of the Overspeed Limit Device

overspeed trip arrangement. If the converter attains an overspeed the trip lever flies out, the switch arm forces its contacts against the contact blocks and an auxiliary circuit is closed. With the usual scheme of connections, the closing of this circuit energizes the solenoid of a tripping device on the alternating-current circuit breakers.

In addition to the overspeed limit switch illustrated, which must reset manually, another switch has been developed which can be reset by a solenoid arranged within the switch box. A circuit extends from the solenoid to the switch-



New Overspeed Limit Device Installed on a Rotary Converter

board and the equipment is so designed that after the switch has been tripped it can be reset by closing the solenoid circuit with a contact button located at the switchboard or any other convenient point. This electrical resetting arrangement is furnished only when specified.

News of Electric Railways

Progress of Negotiations at Toledo

On March 22 City Solicitor Schreiber of Toledo, Ohio, and Attorney Rathbun Fuller, representing the Toledo Railways & Light Company, agreed that a provision shall be inserted in the new franchise to allow the city to purchase the street railway property on six months' notice at a valuation to be fixed by a board of arbitrators selected for that purpose, no values to be allowed for franchises or property not used by the company. Mr. Schreiber insisted that the city should have the right to require a second valuation within one year after the first appraisal, but Mr. Fuller objected to this and it was finally agreed that a second valuation should not be made until two years after the first one. A new clause will be inserted in the ordinance to the effect that an employee shall not be discharged because he is a member of a labor organization. The Toledo Federation of Labor not long ago urged the incorporation of a provision to the effect that the company must not employ any one as motorman or conductor who had not been a resident of the city for at least one year. It was decided that this could not be done, and the only requirement in this respect now is that the company shall employ residents of Toledo whenever possible.

The business and financial interests of Toledo are very much interested in the statement that the stockholders of the Toledo Railway & Light Company plan to take over the interests of the bondholders.

It is probable that the city will build street railway tracks over the new Cherry Street bridge and lease them to the Toledo Railways & Light Company. The city would thus be able to control the operation of cars across the bridge. Mr. Schreiber says that the city can own these tracks, but has expressed doubt as to whether a rental can be collected by the city for their use.

Arbitration of Schedules in Cleveland

The board of arbitration which has been conducting hearings in regard to the dispute between the Cleveland (Ohio) Railway and its employees over the new schedule on Superior Avenue completed its hearings on March 22, 1912, and the attorneys have presented their arguments. Harry Crawford appeared as attorney for the company and former Mayor Robert E. McKisson represented the men. The city was not represented. Street Railway Commissioner Peter Witt refused to be present as representative of the municipality or as a citizen, although he was requested to appear by the company's attorney, the men and the arbitrators.

The hearings were held in the offices of the company in the Electric Building. The first session was called on the morning of March 21. Motorman A. W. Smith, who has been with the company eighteen years, was the principal witness that day. He claimed that the time fixed by the new schedule could not be made without losing the four-minute layover at the end of each round trip and that often the cars were more than four minutes late. Just as many stops were made now as under the old schedule. Passengers objected to the new arrangement.

Motorman Don C. Ashley testified that about eight trips out of ten it was impossible for him to make the layover. Under the old schedule it was sometimes impossible to make the layover, but in that case other cars were put in service to increase the number already in use. This was not done at all now, and no extra trips were made during the rush hours. He insisted that the present schedule cannot be observed by the men. R. S. Marburger, an accountant employed by the men, explained the time cards used in checking up the cars. He showed how the time was used when the car operated by Motorman Smith was too late to allow any layover.

At the hearing on March 22 Motorman William Grady testified that he could make the time under the new schedule only twice a day. He made only six or eight fewer stops now than under the old schedule.

Arthur E. Squires, a conductor on Superior Avenue for nineteen years, stated that the time prescribed by the schedule could be made only when traffic was light. Other testimony was to the same general effect.

Attorney Crawford for the company stated in closing his case that he believed the men could make the time and that they should try to do so, since the schedule was made by the city and the company was bound to carry out its orders if possible. Attorney McKisson for the men stated that the evidence showed that the time could not be made and allow the men the period of four minutes at the end of each run. He asked the arbitrators to find for the men. The members of the board of arbitration stated that they would ride over the line to investigate conditions themselves, and they spent part of Saturday in this work.

Late on the evening of March 26 the arbitrators who were considering the Superior Avenue schedule announced that a decision had been reached in favor of the motormen and conductors. They found that the men could not make the new schedule and have time for the four-minute layover at the end of each run. The company at once requested Mr. Witt to make a schedule under which the company could comply with its agreement with the men. The men have requested the company to re-establish the old schedule.

J. J. Stanley, president of the Cleveland Railway, has placed an order with the G. C. Kuhlman Car Company, Cleveland, for a center-entrance car similar to the new car in New York to be used as a trailer as an experiment.

An amended franchise was granted the Cleveland Underground Rapid Transit Company by the City Council on March 25. Following the enactment of the ordinance W. R. Hopkins, president of the company, announced that if no referendum vote was taken on the measure construction work would be begun late in May or early in June, either at the east end of Euclid Avenue or on Superior Avenue.

Audit of Freight and Express Business at Detroit by the City

It was reported in Detroit that City Auditor Bullock had been told on March 18 by F. W. Brooks, general manager of the Detroit United Railway, that the audit which he was making of the books of the company had proceeded as far as had been agreed between the company and the judiciary committee of the Common Council. The audit was being made with special reference to the freight and express business, so that the city might obtain a guide to the amount of increase to be made in the tax on freight cars which are operated in the city. Mr. Bullock stated that he has not proceeded beyond a verification of the figures relating to the gross earnings which had been furnished by F. W. Brooks, general manager of the company. The city claims that the Electric Depot Company is merely an auxiliary of the railway and that an examination of its books is necessary to determine the profits from the freight business.

Mr. Bullock has since rendered his report of the audit of the books of the company to the judiciary committee of the City Council. The report shows that the gross receipts of the company are $4.68 per car for each round trip within the city limits. Mr. Bullock explained that General Manager Brooks of the company had declined to answer a list of questions given to Mr. Bullock by Chairman Littlefield of the judiciary committee of the Council until Mr. Brooks was satisfied that the questions did not originate from an outside source.

Report at Cleveland in Regard to Electric Railway Express Service in Indianapolis, Columbus and Toledo

As a result of the effort to establish an interurban freight service on the electric railways which enter Cleveland, Ohio, Peter Witt, street railway commissioner of Cleveland, investigated the operation of freight cars in Indianapolis, Columbus and Toledo and presented an abstract of his report

to the City Council recently. The report shows that the wholesale merchants, manufacturers, commission men and business men in general in the three cities mentioned are almost unanimous in their praise of the service, but that residents along the lines on which freight is carried in the city object to the operation of the cars, which are run singly and in trains of two or three.

According to the report, the roads which carry freight in and out of Indianapolis are the Terre Haute, Indianapolis & Eastern Traction Company, Indiana Union Traction Company, Indianapolis & Cincinnati Traction Company, Indianapolis, Crawfordsville & Western Traction Company, Indianapolis, Newcastle & Toledo Electric Railway, and the Indianapolis, Columbus & Southern Traction Company. In all thirteen lines are operated under an ordinance from the Board of Public Works of Indianapolis by agreement with the Indianapolis Traction & Terminal Company, whose terminal tracks and depot are used. All kinds of freight, except live stock, are transported, and the Board of Public Works has the right to regulate the routing of the cars, the schedules and the rates. Freight is carried at all times of the day and night, and the cars are operated on schedules arranged by the several lines. Trains of one, two or three cars are operated through the streets at slow speed in the business district. Cars are loaded and unloaded only at the terminal station.

The report describes how freight in handled at the terminal. Groceries and provisions form the bulk of the outgoing freight, and fruits and farm products in general constitute the incoming shipments. The wholesale merchants, manufacturers and commission men argue that the service has enabled the city to secure much business from neighboring towns that would otherwise have been lost. The United States Express Company carries considerable package freight over these lines to many towns which never before had express service. The freight cars which are used on these roads are of about the same type as those used by the Electric Package Company, Cleveland. Little attempt has been made to compete with the steam railroads on the long-haul business. In 1911 the roads at Indianapolis carried 23,859 carloads of freight.

The companies which operate freight service into Columbus are the Ohio Electric Railway, Scioto Valley Traction Company, Columbus, Delaware & Marion Electric Railway, Columbus, New Albany & Johnstown Traction Company and the Columbus, Urbana & Western Traction Company. They operate over city tracks under an agreement with the Columbus Railway & Light Company. No effort has been made to restrict or regulate the service.

The Ohio Electric Railway operates sixteen trains daily in and out of Columbus between early morning and 4:30 p. m. The Scioto Valley Traction Company operates eight freight trains daily between 9:30 a. m. and 11:30 p. m. Both run trains of one, two or three cars and furnish extra service when needed. The Columbus, Delaware & Marion Electric Railway has five regular trains of one car each daily between 10 a. m. and 5 p. m. The freight is handled at terminal stations in the business district, although the cars formerly stopped at crossings to receive or discharge freight when requested to do so. A new terminal station is under construction. All kinds of freight, including live stock, are handled. During the season of county fairs many horses are shipped over these roads. The transportation of milk has become a feature of the business.

The Ohio Electric Railway and the Columbus, Delaware & Marion Electric Railway use regular electric package cars which are kept in good condition and present a good appearance. The Scioto Valley Traction Company uses steam railroad box cars for trailers. They are painted a uniform color, but are not as sightly as the electric package cars. The rates charged are about the same as on the steam roads. Shipments are made to Cincinnati, Toledo, Richmond and Fort Wayne, Ind., and other points over these lines.

From 3,000,000 lb. to 8,000,000 lb. of freight are handled monthly by the Ohio Electric Railway, while the Scioto Valley Traction Company and the Columbus, Delaware & Marion Electric Railway handle from 3,000,000 lb. to 5,000,000 lb. each. The shipments average, perhaps, 14,000,000 lb. each month. The cars are operated over 16 miles of city streets.

The lines which operate into Toledo, Ohio, are the Detroit, Monroe & Toledo Short Line Railway, Maumee Valley Railways & Light Company, Ohio Electric Railway, Toledo, Bowling Green & Southern Traction Company, Toledo, Fostoria & Findlay Railway, Toledo & Indiana Railroad, Toledo, Port Clinton & Lakeside Railway, and Toledo & Western Railroad. These companies operate the express service without authority from the city, but city officials say that they cannot prohibit the running of freight cars so long as the service does not become a menace to public health. The cars are operated on schedules prepared by the various lines. Six lines operate in conjunction and use the same terminal. There are fifteen freight trains in and out of the city daily between early morning and 5 p. m. Freight cars are also run at night during the summer. Trains consist of one car and an occasional trailer. The Toledo, Bowling Green & Southern Traction Company has six trains daily in and out of the city. They consist of one, two or three cars. The Ohio Electric Railway runs three outbound and two inbound trains of one, two or three cars daily. The last two roads have their own terminal stations.

The roads which operate into Toledo carry all kinds of freight, including live stock. Wholesale merchants and manufacturers use the outbound trains, while farmers and gardeners use the inbound trains to ship fruits, milk and produce. All the roads at Toledo use cars similar to those of the Electric Package Company, Cleveland. The trailers are somewhat smaller than the motor cars. Rates are much the same as on the steam railroads. To a large extent the business is to nearby points, but the Ohio Electric Railway accepts through shipments. The Lake Shore Electric Railway does only a package business. The lines handle practically 15,000,000 lb. of freight monthly, not including milk. Six lines handled 10,000,000 lb. in June, 1911, while the Ohio Electric Railway handled 1,876,000 lb. in January, 1912, and the Toledo, Bowling Green & Southern Traction Company 3,000,000 lb.

Further Consideration of Unification Plans in Chicago

A meeting of the local transportation committee of the City Council of Chicago and the representatives of the traction interests of that city was held on March 27 to discuss the proposed merger of the elevated and the surface railways in Chicago and the construction of a subway. The committee which is acting for the railways is composed of Henry A. Blair for the Chicago Railways, Ira M. Cobe for the Chicago City Railway and Samuel Insull for the Chicago Elevated Railways. At the conference on March 27 Mr. Blair was represented by W. W. Gurley, special counsel, and Mr. Insull was represented by Gilbert Porter. Mr. Cobe attended in person.

City Engineer John Ericson, James J. Reynolds and E. C. Shankland, members of the harbor and subway commission of Chicago, which is working on a valuation report of the elevated railways, discussed the progress of the work which they have in hand and expressed the opinion that this work would be completed soon, as Prof. George F. Swain, who represents the elevated railways on the valuation committee, is going over the estimates.

On March 28 the transportation committee, by a unanimous vote, directed that an ordinance should be drafted for the unification and operation of all the elevated and surface railways in Chicago as a single system with a single fare within the present and future city limits and with interchangeable transfers, and for a passenger subway to be built and owned by the city but operated by the consolidated railways.

Contract Let for Electrification of Bluemont Division of Southern Railway.—The Washington & Old Dominion Railway has contracted with Smethurst & Allen, Philadelphia, Pa., for the electrification of the Bluemont Division of the Southern Railway, running from Washington, D. C., to Bluemont, Va., a distance of about 60 miles.

Pittsburgh Subway Report Adopted.—The Chamber of Commerce of Pittsburgh, Pa., has adopted the report of the transit committee of that body in regard to the terms which should be imposed by the city in granting a franchise for the construction of a subway in Pittsburgh. A brief summary of the terms of the proposed ordinance as re-

ported by the committee was published in the Electric Railway Journal of March 16, 1912, page 436.

Development Plans at Winnipeg.—A syndicate composed of local men at Winnipeg, Man., of which E. B. Reese and R. R. Muir are at the head, is promoting a plan to take over the Winnipeg Electric Railway and subsidiary lines. The same interests have charters for a number of suburban electric railways and steam railroads and own a power site at Big Bonnet Falls on the Winnipeg River, all of which they propose to develop at once. The city of Winnipeg is opposing the charters in the Legislature, claiming that they will injuriously affect the city's rights to take over the present street railway in Winnipeg at the expiration of the charter term in 1927. It is expected that all the differences will be settled satisfactorily in the near future.

California Public Service Act in Effect.—The measure passed at the extraordinary session of the California Legislature in 1911 creating the California State Public Utilities Commission went into effect on March 23, 1912. As stated in the Electric Railway Journal of Jan. 27, 1912, page 172, the act changed the Railroad Commission from an elective board of three to an appointive board of five to be named by the Governor for six years, John Eshelman, H. D. Loveland and Alexander Gordon, the members of the Railroad Commission, to complete their terms and the Governor to appoint two new members. The new members appointed are Max Thelan, who was attorney for the State Railroad Commission, and E. O. Edgerton, formerly a member of the municipal commission of Los Angeles.

Subway System and Consolidation Recommended in Washington.—The construction of a subway in the vicinity of Fifteenth Street and New York Avenue Northwest, Washington, D. C., to relieve the congested street railway traffic of the city, and the consolidation of the electric railways of the District, are the important recommendations made by the District Commissioners to Congress in a special report. The commissioners estimate that if all the street railways within the District were under one management and control there would be a saving of from 5 per cent to 10 per cent in the cost of operation, and the public would be better served. In order to arrive at a determination of the relative value of the two principal systems, the commissioners suggest that each company select a representative of a board to appraise the properties, these to select a third, an expert in street railway values.

Railway Problems at Toronto Before Legislature.—The city of Toronto, Ont., has applied to the Ontario Legislature for operating rights over the Toronto Railway for municipal lines. The railway committee of the Legislature has refused to grant the amendment to the Toronto Suburban Railway's bill sought by the city, which desired the right to extend the company's line over a private right-of-way into the city at a point near Davenport Station. The city wanted permission to appropriate the line within the city limits at a price to be named by the Ontario Railway & Municipal Board. H. L. Drayton, corporation counsel of Toronto, said that the city desired to establish a radial terminal system, arguing that the radial entrance problem could not be solved satisfactorily by granting franchises to private companies. Allen Royce, on behalf of the company, declared that the city's proposal would make it possible for the city to take over the most important part of the system and in this way to isolate the company's suburban lines.

Pole Lines in New York State Must Be Marked.—The Public Service Commission for the Second District of New York has issued an order requiring all electrical corporations and municipalities owning poles and wires on public or private rights-of-way to stencil and number their poles and structures in accordance with detailed instructions set forth in the order. The order affects all central-station telephone, telegraph, railway and municipal corporations. The stencil must exhibit the corporate initials, name or symbol and a number which will distinguish the location. The preferable method of stenciling is with paint, but metal tags, badges or stamps are admissible. In the case of a double line of poles, supporting overhead trolley wires, only one line need be stenciled. When the pole line is a through or trunk line, stencils are only required on every fifth pole except in cities, towns or villages. Every corporation is required to file with the commission before May 1, 1912, a statement of the form of stencil which it has adopted and the method of numbering used. The work of stenciling must be completed by Jan. 1, 1913.

Emergency Lighting System in New York Subway Cars.—The Public Service Commission of the First District of New York ordered the Interborough Rapid Transit Company to install an emergency lighting system in all cars operated in the New York subway. The cars are lighted with electric lamps supplied with current from the same cables which furnish power to the motors. In emergencies, due to accidents or other causes, the power current is sometimes shut off suddenly and this leaves the trains in darkness. The emergency system will furnish a certain number of lamps in each car which will be supplied by current independent of the power cables, either by storage battery or other device, and will be so adjusted that when the ordinary lamps go out the emergency lamps will at once automatically come into service. The order also requires the company to provide uniform illumination at stations, sufficient for reading purposes, on all platforms, and also to install tungsten or other metallic filament lamps in all cars. At present only the cars in the express service of the subway are lighted by tungsten lamps.

Favorable Committee Report on Bill to Abolish Commerce Court.—On March 15, 1912, the Congressional House committee on interstate and foreign commerce ordered a favorable report on the Sims bill to abolish the Commerce Court and vest jurisdiction in the district courts; that is, recreating the conditions which the advocates of the Commerce Court bill deemed obnoxious, viz., making it necessary first to get an order from the commission in Washington and then go to the court in the district where the carrier had its chief operating office for the judicial proceedings necessary to enforce the remedial order. The score kept by the Department of Justice to show the disposition of cases by the circuit courts since the passage of the so-called Hepburn bill of 1906 follows: Total cases in Circuit Court to annul commission's orders since the Hepburn act, 1906, 48; cases never finally decided (transferred to Commerce Court, withdrawn, or otherwise disposed of), 31; cases finally decided by Circuit Court, 17; commission reversed, 9; commission upheld, 7; commission upheld in part, 1; cases decided by Supreme Court, 11; commission reversed, 5; commission upheld, 6.

Pittsburgh Franchises Before Council.—The Pittsburgh (Pa.) Railways has accepted the principle of indeterminate or revocable franchise and the ordinances recently introduced in Council in the interest of the company will be redrafted and submitted later. Some of the new ordinances will provide for a revocation of the charter in one year, while others will run for ten years, with one year's notice for revocation. J. D. Callery, president of the company; S. L. Tone, vice-president of the company, and City Solicitor C. A. O'Brien appeared before the committee of the Council in charge of the measures to explain the proposed ordinances. Some of the ordinances presented have been drawn to facilitate traffic during the cutting of the Fifth Avenue tunnel and are therefore intended for lines of a temporary nature. All of the grants for permanent lines, however, provide for fifty-year franchises. Solicitor O'Brien stated that all franchises of the future should be so drawn that their terms could be readjusted from time to time in accordance with the dictates of the experience gained in actual operation. Mr. Callery said that the company would not accept any ordinance with a compulsory agreement in regard to transfers.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

MASSACHUSETTS

The committee on street railways has voted leave to withdraw the bill to limit franchises granted street railways in connection with the transportation of freight and express matter, planned to do away with the granting of indeterminate franchises subject to the jurisdiction of the Railroad Commission. Leave to withdraw the bill to require the Bay State Street Railway to issue free transfers to passengers in the Fore River district of Quincy has been voted and the

report has been accepted in both branches. The bill to provide for a change of location of the Boston & Eastern Electric Railroad by the Railroad Commission to include a subway under Lynn Common has been passed to be engrossed. A resolve has been passed to require the Boston Transit Commission to report in January, 1913, upon the cost and route of an extension to the Dorchester tunnel between Andrew and Codman Squares. Leave to withdraw has been given in connection with the bill to require the commission to determine the cost of substituting a new structure for the present elevated at Forest Hills, Boston, and the adverse action of the committee on metropolitan affairs on this subject has been accepted. An act has been passed to permit the Boston, Revere Beach & Lynn Railroad to purchase the Point Shirley Street Railway. The committee on street railways has voted to refer to the next Legislature the bill to make fares between Dedham and Forest Hills more uniform, and has voted leave to withdraw the bill to require air brakes on double-truck cars and seats for motormen on all cars. Leave to withdraw has been reported by the committee on street raiways upon the bill to require all street cars to be equipped with air brakes by 1920. The bill to provide for the state or municipal ownership of street railways has been reported on adversely by the committee and the Senate and House have sustained the report.

NEW YORK

The interest in measures affecting electric railways which are before the Legislature has centered recently in the pending subway legislation for New York City. A bill providing for legislation on all of the features of the agreement to be entered into by the officials of New York City and the Interborough Rapid Transit Company and the Brooklyn Rapid Transit Company was introduced by Senator Wagner on March 20. This bill would broaden the powers of the public authorities and was introduced to enable the commission and the Board of Estimate and Apportionment of New York to deal with the subway proposals. This measure was formally approved by the Board of Estimate on March 21. J. Sergeant Cram and Milo R. Maltbie, of the Public Service Commission, however, are opposed to the passage of the bill. The hearing on the bill was held before the cities committee of the Senate and the Assembly on March 26. Among those who supported the bill were Chairman Willcox, of the commission; Corporation Counsel Watson, who represented Mayor Gaynor of New York; Comptroller William A. Prendergast of New York, and Borough Presidents McAneny, Miller and Connolly. On March 27 the Senate, following an emergency message from Governor Dix, passed the Wagner bill, amended to eliminate the provision to permit the construction of an elevated railway on Franklin Avenue, Brooklyn. The bill was sent to the Assembly for concurrence on March 28 and the measure was passed by the House by a vote of 144 to 6. On March 27 the Senate passed the Stillwell bill to provide for free transfers by surface railways in Manhattan and the Bronx at a number of points specified in the bill. The Senate has passed the bill advocated by Governor Dix for the development and transmission of electricity by the State. A. T. Sullivan, president of the Nassau Trust Company, of Brooklyn, it is stated, will be nominated by Governor Dix for appointment to the Public Service Commission of the First District to succeed Commissioner McCarroll, whose term has expired.

RHODE ISLAND.

The judiciary committee of the House has recommended the public utility bill for passage, but has added among other new clauses an amendment to permit members of the General Assembly to accept free transportation over all railroads operated within the State and a clause to permit railroads to issue transportation to the publishers of newspapers and magazines and their employees in return for advertising. The workman's compensation bill, known as the Beeckman act, has been reported favorably to the Senate. As stated in the Electric Railway Journal of March 9, 1912, page 403, the commission is to consist of three members to be appointed by the Governor for six years. The attorney general is to be the legal representative of the commission in all cases, and provision is made for appeal to the Supreme Court from its decisions.

Financial and Corporate

Stock and Money Markets

March 27, 1912.

Prices on the New York Stock Exchange advanced immediately after the opening of the market to-day, but the announcement shortly after noon of the sale of $30,500,000 of bonds by the United States Steel Corporation was used as a pretext for a selling movement with the result that the day closed with net losses in a considerable number of issues, including most of those particularly conspicuous in the previous advance in prices. Quotations for loans to-day were: Call, 2⅜@2¾ per cent; sixty days, 3¼@3½ per cent; ninety days, 3½@3¾ per cent.

In the Philadelphia market trading was active, but prices declined toward the close. United Gas Improvement, Philadelphia Electric and Union Traction were among the issues in which there was a reaction.

In the Chicago market trading was for the most part confined to the industrial issues. The bond market was very dull.

In the Boston market the railroads and industrial issues were dull and the tendency of the general list was to react.

The market for stocks in Baltimore was dull, but several important sales of bonds were recorded.

Quotations of traction and manufacturing securities as compared with last week follow:

	Mar. 20	Mar. 27
American Brake Shoe & Foundry (common)	a95¼	a96
American Brake Shoe & Foundry (preferred)	a132¾	a134½
American Cities Company (common)	*29¾	a33½
American Cities Company (preferred)	a80½	a82½
American Light & Traction Company (common)	*302	a302
American Light & Traction Company (preferred)	a109	a109
American Railways Company	[illegible]	[illegible]
Aurora, Elgin & Chicago Railroad (common)	a43	a44
Aurora, Elgin & Chicago Railroad (preferred)	a88	86
Boston Elevated Railway	a132½	a134
Boston Suburban Electric Companies (common)	a15	a15
Boston Suburban Electric Companies (preferred)	a77½	a77½
Boston & Worcester Electric Companies (common)	a13	a10½
Boston & Worcester Electric Companies (preferred)	a56	a56
Brooklyn Rapid Transit Company	81⅝	83¼
Capital Traction Company, Washington	126½	a125
Chicago City Railway	a190	a190
Chicago Elevated Railways (common)	a33	a35
Chicago Elevated Railways (preferred)	a94	a95
Chicago Railways, ptcptg., ctf. 1	a100	a100
Chicago Railways, ptcptg., ctf. 2	a34	a35½
Chicago Railways, ptcptg., ctf. 3	a9½	a9½
Chicago Railways, ptcptg., ctf. 4	a5¾	a5¼
Cincinnati Street Railway	a131	a131
Cleveland Railway	a104½	a104½
Cleveland, Southwestern & Columbus Ry. (common)	*4¾	*4¾
Cleveland, Southwestern & Columbus Ry. (preferred)	*33	*33
Columbus Railway & Light Company	a55	a55
Columbus Railway (common)	a80	a80
Columbus Railway (preferred)	a94	a94
Dayton Street Railway (common)	a25	a25
Dayton Street Railway (preferred)	a100	a100
Denver & Northwestern Railway	*135	*135
Detroit United Railway	a70	a70
General Electric Company	a166¼	a166¾
Georgia Railway & Electric Company (common)	a172	a176
Georgia Railway & Electric Company (preferred)	a86	a87½
Interborough Metropolitan Company (common)	a19⅛	20⅝
Interborough Metropolitan Company (preferred)	a59¼	60⅝
International Traction Co., 4% bonds, ctfs.	*75	*75
Indiana [illegible] Traction Company	*10½	*10½
Kansas City Railway & Light Company	[illegible]	a20
Kansas City Railway & Light Company (preferred)	[illegible]	a50
Lake Shore Electric Railway (common)	*6½	*6½
Lake Shore Electric Railway (1st preferred)	*90	*90
Lake Shore Electric Railway (2d preferred)	[illegible]	[illegible]
Manhattan Railway	a138	a138
Massachusetts Electric Companies	a22½	a22½
Massachusetts Electric Companies (preferred)	[illegible]	a96¾
Milwaukee Electric Railway & Light Company	105	*105
Norfolk Railway & Light Company	27	27
North American Company	a80⅜	a79¼
Northern Ohio Light & Traction Company (common)	a57½	a65
Northern Ohio Light & Traction Company (preferred)	a100	a105
Philadelphia Company, Pittsburgh (preferred)	a54½	a54½
Philadelphia Company, Pittsburgh (common)	a44	a44
Philadelphia Rapid Transit Company	23⅛	a23⅛
Portland Railway, Light & Power Company	*71½	*71½
Public Service Corporation	a112	a112
Seattle Electric Company (common)	*118	*118
Seattle Electric Company (preferred)	*103	*103
Third Avenue Railway, New York	43½	42
Toledo Railways & Light Company	a3¼	a10
Twin City Rapid Transit Co., Minneapolis (common)	a106	a105⅜
United Rys. & Electric Company (Baltimore)	*20½	*20½
United Rys. Inv. Co. (common)	35½	a35
United Rys. Inv. Co. (preferred)	63½	62¾
Virginia Railway & Power Company (common)	a47	a47½
Virginia Railway & Power Company (preferred)	a88½	88½
Washington Ry. & Electric Company (common)	*74⅞	a90
Washington Ry. & Electric Company (preferred)	*92½	a95⅛
West End Street Railway, Boston (common)	a88½	a86¼
West End Street Railway, Boston (preferred)	a103½	a103
Westinghouse Elec. & Mfg. Co.	a74½	a78½
Westinghouse Elec. & Mfg. Co. (1st preferred)	a122	a121⅞

*Last sale. a Asked.

ANNUAL REPORT

Public Service Corporation

Earnings and expenses of the Public Service Corporation of New Jersey, Newark, N. J., and its subsidiary companies for the year ended Dec. 31, 1911, with a comparison for 1910 and 1909, follow:

Year ended Dec. 31.	1909.	1910.	1911.
Gross revenue from railway	$12,114,412	$13,308,726	$14,450,088
Gross revenue from gas	7,870,879	8,491,882	8,985,688
Gross revenue from electric	5,117,728	5,872,238	6,689,732
Income from miscellaneous sources	1,457,432	1,532,348	1,890,513
Total gross income	$26,560,451	$29,205,194	$32,016,021
Operating expenses and taxes	13,331,228	14,611,300	15,941,691
Amortization charges			
Total			$16,614,345
Net revenue	$13,229,223	$14,593,894	$15,401,676
Bond interest and rentals of leased and controlled companies	10,111,404	10,558,243	11,066,651
Net earnings	$3,117,819	$4,035,651	$4,335,025
Interest	1,689,372	1,835,356	2,540,243
Net income	$1,428,447	$2,200,295	$1,794,782
Reserves Public Service Corporation		125,000	
Reserves Riverside and Fort Lee Ferry Co.		5,000	
Surplus	$1,428,447	$2,070,295	$1,794,782

From the surplus for the year dividends at the rate of 6 per cent per annum, or $1,500,000, were paid on the capital stock of the corporation.

President Thomas N. McCarter in his report to shareholders says in part:

"The properties of the companies owned by the corporation have been maintained throughout the year at a high standard of efficiency.

"The most important of the improvements completed during the year is the new power station at Perth Amboy. This is a modern, thoroughly up-to-date power station, of only moderate-sized units, however, designed to care for the rapidly increasing electric and railway load in the Central division. There has also been constructed a large new carhouse, known as the 'Hilton carhouse,' located on Springfield Avenue, in the township of South Orange, in the Essex division. A similar type of carhouse is in course of construction at Big Tree, in the town of Nutley, in the Essex division. Twenty revenue passenger cars have been built at the Plank Road shops of the railway company, together with a considerable amount of other additional railway equipment. The pay-as-you-enter or prepayment equipment of the cars of the railway company has been continued, so that there is now a total of 904 cars of this character in operation. A storage carhouse at the Passaic Wharf to house out-of-season equipment has been completed. This building, together with other carhouses heretofore constructed, makes it possible to have under cover all out-of-season passenger equipment.

"Two hundred and three single-end pay-as-you-enter cars were equipped with gates at the rear platform, and 121 double-end cars of the prepayment type were equipped with full-closed vestibules, with doors which are operated by the conductor.

"The taxes paid during the year amount to $1,659,741, an increase over 1910 of $237,042. In addition to this, the corporation contributed large sums to municipalities in the form of new pavements, street-paving repairs and street-paving assessments.

"The fire insurance carried at the present time is $24,329,816, and the annual premium therefor is $119,421, an average rate of 49 cents per $100.

"The annual report for 1910 contained a description, in considerable detail, of the insurance, sick benefit and pension fund, commonly known as the welfare fund, put into effect by the corporation on Jan. 1, 1911. It is a pleasure to state that the operation of this fund has worked to advantage, even beyond our greatest expectations. By means of it the corporation has performed a generous and humane work for its employees, the result of which has been the creation of a better feeling between the corporation and its employees.

"It had been estimated that the operation of the fund would cost the corporation $50,000 per year. The actual expenditures for the first year were $48,788, distributed as follows: Insurance, $18,376; sick benefits, $22,956; pensions, $5,495; expenses, $1,961.

"The welfare committee, in charge of this work, has presented a very elaborate report, full of most instructive detail, which tends to increase our confidence in the success of the plan in the future. It is a feeling of genuine satisfaction to the management of the corporation to know that in this enlightened day it is doing its full duty in alleviating the suffering and providing in a measure for the old age of its employees, and that it is also making its presence felt at the inevitable time of death.

"The Legislature of New Jersey for the year 1911 passed the so-called workmen's compensation or employers' liability act. Fearing, lest it might be unconstitutional, to make the act compulsory, the Legislature provided a means of acceptance or rejection of the law by employer and employee alike. The corporation, in contradistinction to many other large companies, immediately accepted the provisions of the act, as did also an overwhelming percentage of its employees. We regard this act as a further illustration of the enlightened policy of the day that should affect all corporations toward their employees, and as complementing the welfare plan already voluntarily put into effect by the corporation. We think this act has further tended to cement the relations between the corporation and its employees.

"The Legislature of 1911 also passed an entirely new public utilities law, containing very radical provisions, and the commission has been operating under it since May 1 last. We are of the opinion that the act is crudely drawn, and that it contains entirely too broad and sweeping powers, some of which are probably unconstitutional. So far as we are concerned, however, no cases have come before the commission involving these particular provisions of the act. The commission finds itself full of labor and is going about its work in a most serious and painstaking manner. We have accepted the provisions of the act in the spirit of its enactment and have done our best to co-operate with the commission in the many matters affecting the corporation which have come before it.

"During the summer of 1911 an agitation arose, largely political in character we think, for the lowering of the gas and electric rates in the Passaic division, which has spread to one or more of the other divisions served by the corporation. Upon complaint by the cities of Paterson and Passaic, the commission inaugurated on its own initiative an investigation as to the propriety of the rates being charged for gas throughout the Passaic division of the corporation. A request was made by the commission that the president of the corporation should furnish the commission with all the information in his possession relating to the history of the property and characteristics of the gas and electric business as carried on by the subsidiaries of the corporation in this division. In response to this, the president, on Sept. 27, delivered before the commission an exhaustive historical sketch of the gas, electric and railway business now carried on by the subsidiaries of Public Service, not only in the Passaic division, but throughout the State of New Jersey, including a full disclosure of the figures of the corporation, gross and net, its operating expenses and its estimate of increases and earnings for the next five years. At the same time, he offered, on behalf of the corporation, to acquiesce in an order which he suggested should be made by the commission fixing the price of gas at the uniform base rate of $1 per 1000 cu. ft. throughout the entire territory served by the Public Service Gas Company for 1912 and 1913; at the uniform base rate of 95 cents per 1000 cu. ft. for 1914 and 1915, and the uniform base rate of 90 cents for 1916.

"In respect to the electric rates the president offered to agree to an order providing for a uniform base rate of 10 cents per kw-hr. throughout the territory served by the Public Service Electric Company for 1912, 1913 and 1914, and that on Jan. 1, 1915, this base rate should be further reduced from 10 cents to 9 cents, and that as of Jan. 1, 1912, the same schedule of discounts from the base rate should be put into effect as was recently put out by the company which furnishes Manhattan Island with similar service.

"The theory of this offer made by the president, with the approval of the board of directors, was that if put into

effect it would settle the rate question in New Jersey for five years; that it would enable each of the two operating companies, gas and electric, to meet its respective fixed charges and pay an 8 per cent dividend on its respective capital stock, and that these dividends, together with the earnings from the railway company, flowing into the possession of the corporation, the owner of the underlying stocks, would enable the corporation during the same period to pay dividends ranging from 6 per cent to 8 per cent.

"The commission received the proposition with courtesy. The municipalities of Paterson and Passaic, which had in the first instance made the complaints as to charges, showed no disposition to accept the offer, and the commission naturally felt under the circumstances that it was its duty to make a complete investigation of the value of the property of the gas company located within the Passaic division and devoted to the public use, together with a study of the principles which it was bound to consider in fixing the rates. This investigation is now proceeding and is being conducted, so far as the gas company is concerned, with great thoroughness and attention to detail. It is the confident belief of the management that not only will a proper consideration of all the problems involved confirm the fairness of the proposition of the president, but that it will justify the continuance of existing rates. The corporation has done its best to meet this question in a fair and equitable spirit, and as a reasonable and amicable adjustment of the matter has not been practicable, from henceforth the corporation will protect its rights to the limit.

"The existing conditions throughout the country, the political uncertainty which surrounds the future and the natural anxiety of the investing public in reference to the outcome of the attack upon the rates charged by the corporation have all combined to depress slightly the market value of the corporation's securities, but the fact is that the properties controlled by the corporation were never before in such sound physical and financial condition, the increases —gross and net—were never more stable, and a reasonably prosperous future for the corporation is protected behind a constitutional bulwark which no amount of radicalism can destroy."

Expenditures charged to capital account during 1911 by the various properties were as follows: Electric, $2,635,689; gas, $1,415,723; railway, $1,507,065, less $357,907 written off for depreciation, etc, $1,149,158; total, $5,200,570.

Traffic statistics show the following results in the railway system for the last three years:

	1909.	1910.	1911.
Revenue passengers	238,171,257	258,746,130	277,730,238
Transfers and passes	81,548,978	82,652,558	84,820,157
Total passengers	319,720,235	341,398,688	362,550,395
Percentage of passengers using transfers	23.0	22.1	21.4
Average fare per passenger, cents.	3.72	3.78	3.82
Car mileage	40,890,360	42,632,760	44,561,141
Car hours	4,747,729	4,961,608	5,159,073
Passengers per day	875,946	951,721	993,289
Passenger receipts per car mile, cents	29.08	30.29	31.07
Passenger receipts per car hour.	$2.50	$2.60	$2.68

Altoona & Logan Valley Electric Railway, Altoona, Pa.—The Altoona & Logan Valley Electric Railway has acquired the property of the Logan Light & Power Company, Tyrone, Pa., which will be operated in conjunction with the Home Electric Light & Steam Heating Company, a subsidiary of the Altoona & Logan Valley Eectric Railway.

American Utilities Company, New York, N. Y.—The American Utilities Company, the incorporation of which was noted in the Electric Railway Journal of March 2, 1912, is capitalized at $2,000,000. Of this stock $1,000,000 is preferred and $1,000,000 common. Of the preferred stock $500,000 has been issued, while all the common stock has been issued. The preferred stock has preference both as to principal and dividends, and is cumulative from Feb. 1, 1912, at the rate of 6 per cent per annum and cumulative from Feb. 1, 1914, at the rate of 7 per cent per annum. The company has no bonds. The officers of the company are: William P. Bonbright, president; S. W. Childs, vice-president; Morris W. Stroud, Jr., vice-president; J. P. Carey, secretary and treasurer; William P. Bonbright, Starling W. Childs, Samuel M. Clement, Jr., Alexander D. Grange, Walter H. Lippincott, John C. Loury, Charles H. Ludington, Frederick W. Stehr, Morris W. Stroud, Morris W. Stroud, Jr., Joseph B. Townsend, Jr., and Charlton Yarnall, directors.

Baltimore & Washington Transit Company, Washington, D. C.—The property of the Baltimore & Washington Transit Company, which operates 4 miles of line between Washington and Takoma Park, was sold under foreclosure recently to Charles A. Selden, Jr., for $20,500, subject to receivers' certificates, which amount to $20,000, and other liens, which amount to about $10,000. Mr. Selden, it is said, represents the interests which originally constructed the road.

Cape May, Delaware Bay & Sewell's Point Railroad, Cape May City, N. J.—It is reported that Nelson Z. Graves, Philadelphia, Pa., has purchased from the Reading Company the Cape May, Delaware Bay & Sewell's Point Railroad and the Ocean Street Passenger Railway, Cape May City. Mr. Graves is a very large holder of real estate in Cape May and vicinity.

City Railway, Dayton, Ohio.—George G. Shaw has been elected a director of the City Railway, to succeed M. R. Dickey, resigned.

Dixon, Rock Falls & Southwestern Electric Railway, Tampico, Ill.—The Dixon, Rock Falls & Southwestern Electric Railway has been taken over by new interests represented by R. H. Mathis, Prophetstown, Ill.

Georgia Railway & Power Company, Atlanta, Ga.—New officers and directors have been elected as follows by the Georgia Railway & Power Company, which has leased the property of the Georgia Railway & Electric Company: Preston S. Arkwright, president; H. M. Atkinson, chairman of the board; G. W. Brine, vice-president and general manager; W. H. Glenn, vice-president and secretary; I. S. Mitchell, Jr., treasurer; Harry Flynn, auditor; Paul Reid, assistant secretary; Preston S. Arkwright, Elliott G. Stevenson, H. M. Atkinson, Randal Morgan, Jack J. Spalding, Forrest Adair, George C. Moore, C. Elmer Smith, Thomas Egleston, Frank Hawkins, Thomas K. Glenn, John E. Murphy, Robert Maddox and Alex. C. King, directors. Most of the new officers of the Georgia Railway & Power Company held corresponding positions with the Georgia Railway & Electric Company. Louis B. Magid has filed a suit in the United States Court at Atlanta against the Georgia Railway & Power Company, the Georgia Power Company and the Atlanta Power Company asking damages under the Sherman anti-trust statute, alleging that the defendants and others conspired and combined to restrain and suppress interstate commerce and to create a monopoly in the commerce of electricity for lights and power. A suit has also been filed in the state court by Mr. Magid against the Georgia Railway & Electric Company and the Georgia Railway & Power Company to enjoin the execution of the lease from the one company to the other and to have such lease canceled.

Havana (Cuba) Electric Railway.—The Havana Electric Railway & Power Company was incorporated in New Jersey on March 26, 1912, with an authorized capital stock of $30,000,000 as the holding company to take over the Havana Electric Railway and the Compañia de Gas y Electricidad de la Habana, in accordance with the plan referred to in the Electric Railway Journal of March 16, 1912, page 440.

Indiana Union Traction Company, Anderson, Ind.—The following statement in regard to the proposed consolidation of the Indiana Union Traction Company, Union Traction Company of Indiana and the Muncie, Hartford & Fort Wayne Railway is made in a circular signed by W. H. Forse, Jr., secretary: "At the meeting of stockholders of the Indiana Union Traction Company held on March 5, 1912, the directors were instructed to consider a consolidation between the Indiana Union Traction Company, Union Traction Company of Indiana and the Muncie, Hartford & Fort Wayne Railway, the directors to report to an adjourned meeting of the stockholders on March 28, 1912. It will be impossible to make a report on such consolidation in time to give the desired notice to stockholders before the adjourned meeting on March 28, 1912, and a resolution will be presented for a further adjournment to April 9, 1912."

Indianapolis & Louisville Traction Company, Scottsburg, Ind.—James C. Chapman, vice-president of the Colonial Trust Company, Pittsburgh, Pa., representing the first mortgage bondholders of the Indianapolis & Louisville Traction Company, purchased the property of the company at receiver's sale at Scottsburg, Ind., on March 21, 1912, for $750,000, the upset price. A new company to succeed the Indianapolis & Louisville Traction Company has been incorporated under the name of the Indianapolis & Louisville Electric Railway Company, with a capital stock of $1,200,000, divided into $600,000 of preferred stock and $600,000 of common stock.

Nashville Railway & Light Company, Nashville, Tenn.—It is now stated that E. W. Clark & Company, Philadelphia, Pa., and Hodenpyl, Hardy & Company and William P. Bonbright & Company, New York, N. Y., are interested with H. M. Byllesby & Company, Chicago, Ill., in the deal which is pending to take over the property of the Nashville Railway & Light Company and that a holding company will be organized to take over public service properties in Nashville, Louisville and Chattanooga.

Orange County Traction Company, Newburgh, N. Y.—The Public Service Commission of the Second District of New York has authorized the Orange County Traction Company to issue its 5½ per cent equipment trust certificates to the par value of $48,000. The proceeds of this issue are to be used to purchase eight single-truck, four double-truck and four dump cars.

Ottawa (Ont.) Electric Railway.—Stockholders of the Ottawa Electric Railway of record on March 1, 1912, are offered until March 31, 1912, the right to subscribe to the extent of 50 per cent of their holdings for $623,900 of new stock at par, payable 25 per cent each on April 1, May 1, June 1 and July 1, 1912, or optionally in full on any of said dates. The new stock will rank for dividends from the date of full payment.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—Initial quarterly dividends at $1.50 and $1 per share have been declared on the $6,968,333 of preferred stock and $16,546,360 of common stock, respectively, of the Puget Sound Traction, Light & Power Company, payable on April 15, 1912, to holders of record of March 28.

United Properties Company, Oakland, Cal.—The San Francisco-Oakland Terminal Railways has been organized to operate the Oakland Traction Company, San Francisco, Oakland & San José Consolidated Railway, East Shore & Suburban Railway, Sacramento Short Line Railway, San José Short Line Railway, Pacific Terminal Company and the California Railway, which have heretofore been operated by the United Light & Power Company, all of the stock of which is owned by the United Properties Company of California, which also controls through ownership of stock the railways previously mentioned. The organization of the San Francisco-Oakland Terminal Railways will eliminate the Oakland Railways and segregate the railway and lighting properties of the United Light & Power Company.

ELECTRIC RAILWAY MONTHLY EARNINGS

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

Period.			Gross Earnings.	Operating Expenses.	Net Earnings.	Fixed Charges.	Net Surplus.
1m.	Jan.,	'12	$7,163	$6,878	$285	$1,055	$770
1 "	"	'11	7,471	6,338	1,133	1,125	8

CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.

1m.	Jan.,	'12	$28,328	$17,495	$10,832	$5,636	$5,196
1 "	"	'11	27,443	15,290	12,153	5,655	6,499

COLUMBUS (GA.) ELECTRIC COMPANY

1m.,	Jan.,	'12	$50,107	$23,579	$20,737	$18,408	$8,120
1 "	"	'11	43,263	18,750	20,288	11,739	12,774

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, PHILADELPHIA, PA.

1m.	Jan.,	'12	$535,906	*$302,297	$233,609	$115,651	$117,958
1 "	"	'11	473,115	*256,051	217,064	100,112	116,952

GRAND RAPIDS (MICH.) RAILWAY

1m.	Jan.,	'12	$91,627	*$53,999	$37,628	$14,727	$22,901
1 "	"	'11	81,836	*48,687	33,149	15,121	18,028
2 "	"	'12	189,075	*108,659	80,416	29,518	50,898
2 "	"	'11	173,903	*99,723	74,180	30,222	43,958

*Includes taxes.

Traffic and Transportation

Circular on Economy

H. A. Nicholl, general manager of the Indiana Union Traction Company, issued the following circular on economy to the employees recently:

"Just a word regarding economy.

"Did you ever stop to think of the difference between wastefulness and economy—between the careful and the careless person? Would you look for efficiency, for success in life, to come from wastefulness? Hardly. So the contrary is undoubtedly true and the valuable employee is the careful, economical and, therefore, the efficient one. Take the matter of office stationery and supplies; the items are small, even insignificant in themselves, but when taken in the aggregate the amount is considerable and we should like to enlist your co-operation toward reducing this amount to the minimum.

"A few suggestions along this line are:

"Letterheads.—Use the smaller note-size letterheads for short letters. In addressing letters to the various departments of the company use plain paper or 'to and from' blanks instead of the printed letterheads.

"Scratch Paper.—Where a letter is spoiled before being completed if the sheet of paper is laid aside and used as scratch paper instead of being thrown in the wastebasket the full value of using it will be obtained and less scratch paper will have to be ordered from the stationer. Do not use printed forms of any kind for scratch paper simply because they are handy. Keep scratch paper convenient; it will be provided if asked for.

"Carbon Paper.—Experiments show that from one sheet of carbon paper nearly 100 legible copies can be made. Carbon paper deteriorates with exposure and curls up, so the least possible number of sheets should be in use at one time. Use each sheet until an equivalent of 100 copies is made and you will obtain its maximum degree of service.

"Rubber Bands and Erasers.—The price of rubber is continually increasing, and these articles represent the most expensive of office supplies. Do not waste rubber bands or erasers. An eraser fastened to your typewriter or desk by a cord (or rubber band to give elasticity) will not only be found a time saver, but will prevent the possible actual loss of the eraser. An old or small eraser is just as good as a new or larger one.

"Envelopes.—Where more than one letter is sent to the same person each day an envelope should be addressed and left open until mailing time, so as to avoid using several envelopes for taking care of mail that could be inclosed in one. Large envelopes cost more than small, and where a small envelope will answer it should be used, even though it is not on your desk. It will not take a minute's time to get one from your stationery supply.

"Pencils.—Use one pencil at a time where possible and do not throw aside short pencils.

"Telegraph and Telephone Service.—Mail service should be used in preference to telegraph and long-distance telephone whenever possible to do so without detriment to the company's interest.

"Wrapping Paper and Cord.—These should not be wasted. Frequently they can be used a second or third time. By saving paper and cord from packages received in your office your requisitions for these articles will be very few.

"Gas and Electric Light.—In these items a very large saving can be made. It is not necessary to turn on all lights at once. Use only what are required, and turn them off when leaving the office or when you can see just as well without their use.

"Watch the little things—the big ones will take care of themselves. One hundred pennies make one dollar, and dollars saved are dollars earned. There are many ways in which you can earn your salary; let the economical use of the articles enumerated above be one of them.

"Please remember that others notice the little ways in which you do or do not guard and promote the company's interest, even though nothing is said. One may not know what he is doing which might count for or against him, should opportunity for advancement arise.

"Above all, for your own sake, do not waste time.

"We certainly will appreciate your earnest co-operation in our effort to save the pennies and dollars and thereby reduce the large expense which we are now burdened with."

Fares in Lincoln and Suburbs

The Lincoln (Neb.) Traction Company has withdrawn its application to the State Railway Commission to charge a straight 5-cent fare in Lincoln instead of selling six tickets for 25 cents, but has continued its petition to have the commission rescind its order reducing the rates to Havelock to correspond with those to College View and University Place. In its formal notice filed with the commission the company says in part:

"The application for a 5-cent fare is hereby withdrawn and dismissed as against the city of Lincoln. This action is taken not because the company believes the existing fare is just, but because it has become apparent that the opposition to it among the patrons is so strong that further agitation would lead to a tedious and prolonged controversy. Transportation is a business, and every business suffers when it becomes involved in controversy. If cheap transportation is the desired end, this community is one of the most favored in the United States. Throughout the United States the general fare is straight 5 cents. In theory Wichita sells tickets at a reduced rate, but the receipts from ticket sales in that city are only 18 per cent of the total receipts.

"The effect of a reduced fare is necessarily to check development. New lines as a rule do not pay operating expenses for four or five years. Street railway systems grow only as established lines become sufficiently profitable to support new lines. This is the history of all systems. The future of every city whose commercial foundation is not yet secure is to a considerable extent dependent upon the activity of electric transportation companies. The street railway is the nucleus of suburban and interurban lines. The policy of our municipal neighbors is to stimulate the building of such lines.

"Every community is, however, the judge of its own policy, and as it clearly appears that the present sentiment strongly favors low cost of service as against development, it would be unwise for the company to oppose this sentiment. While the lower fare will compel the company to be more conservative in development than the companies enjoying a straight 5-cent fare, no effort will be spared to maintain an efficient service—a service equal to the best in cities of the same class and in which the fare and conditions of operation are similar.

"The application is retained as to Havelock, College View and University Place. Passengers are now carried from Havelock to Lincoln, a distance of 7.25 miles, for 4 1-6 cents with transfer privileges good to College View, a total distance of 13.25 miles. The local business in these suburbs is practically negligible. The Havelock service is therefore a 7.25 mile service. This is what the patron receives for the fare paid. Investigation will disclose, the company believes, that the fare paid by the patrons living beyond the city limits is less than the actual cost of service. The Havelock, College View and University Place lines do a local business in Lincoln, and the operating sheets of the company as now kept do not separate the receipts of the business done within the city from that done outside the city. To ascertain the amount actually paid by the citizens of these suburbs for the service rendered will require a daily record of the outside business for such a period as will be sufficient to demonstrate the facts of operation. The company therefore asks for a continuance of the hearing in order that it may present to the commission data showing the cost of service to the suburbs and the amount paid for the service."

Gasoline-Electric Motor Car Service Between Dallas and Sherman.—The St. Louis & San Francisco Railroad has decided to establish a service with gasoline-electric motor cars between Dallas and Sherman, operating via Irving, Frisco and Celina. The Texas Traction Company now operates an interurban electric railway between Dallas and Sherman.

Operating Schedules to be Filed in San Francisco.—The public utilities committee of the Board of Supervisors of San Francisco, Cal., has adopted a resolution directing all the street railways in San Francisco to file their schedules with the board, so that they will be easy of access to Bion J. Arnold, who has been retained by the Board of Supervisors to report on street railway traffic conditions in that city.

Suits in Chicago for Alleged Violation of Heating Ordinance.—More than sixty new suits will probably be started against the railways in Chicago for alleged violation of the city's heating and ventilating ordinance. Thirty of the suits are to be brought against the Chicago Railways and thirty-three against the Northwestern Elevated Railroad. The complaints which have been filed against the companies were for failure to provide thermometers and sufficient heat.

Sprinkling Ordinance Passed in St. Paul.—The Aldermen of St. Paul, Minn., have passed the ordinance to require the Twin City Rapid Transit Company to sprinkle the street between the tracks with calcium chloride when the temperature is at freezing or below. Horace Lowry, manager of the company, urged as a substitute a contract between the city and company providing that the city do the sprinkling and present its bill to the company for payment.

Accidents in Indiana.—An east-bound local passenger car of the Fort Wayne & Northern Indiana Traction Company ran into a pile of cinders dumped for ballast west of Peru and left the track and overturned in the bed of the old Miami Canal. None of the thirty-five passengers was killed, but a number were injured. At 8 p. m. on March 22 a west-bound passenger car and an east-bound passenger car collided near Fortville on the Indiana Union Traction Company's line. Both cars were telescoped. The motorman of the west-bound car was killed. A number of passengers were injured in this accident.

Growth of Traffic in Times Square, New York.—Owing to the increase in the subway traffic at the Times Square station, at Broadway and Forty-second Street, New York, the Public Service Commission of the First District of New York has decided to build another stairway at the southwest corner of that intersection to facilitate entrance to and exit from the Times Square station. The total number of tickets sold at the Times Square station for the year ended June 30, 1911, was 11,663,025, an increase of 387,500 over the previous year. The ticket sales at the Times Square station are exceeded only by those at the Grand Central, Fourteenth Street, Brooklyn Bridge, Fulton Street (Manhattan) and Atlantic Avenue (Brooklyn) stations. With the new stairway, each corner at the intersection of Broadway and Forty-second Street (Times Square) will have entrance to the subway.

Final Hearing on Routing of Troy and Rensselaer Cars.—The final hearing has been held on the complaint of the South End Business Men and Taxpayers' Association to secure an order from the Public Service Commission to require the United Traction Company to run its Troy and Rensselaer cars through South Pearl Street. L. A. Roso produced the result of a canvass of the petitions before the commission from residents of Rensselaer, all asking that cars from that city run through South Pearl Street instead of Broadway. The canvass showed that, of 350 names, 218 admitted signing, 120 claimed never to have signed, and the location of a number of persons who signed could not be found. Affidavits were also presented by two persons to the effect that persons circulating petitions asking that Rensselaer cars run through South Pearl Street had represented that they came from the Public Service Commission. Commissioner Decker presided at the hearings before the commission.

Owl Service Not Justified in La Crosse.—Peter Valier, general manager of the La Crosse (Wis.) City Railway, has issued the following statement in regard to the petition which is before the City Council to require the company to establish an "owl" service. "We have always felt that by running an owl car on the North Side line leaving the corner of Fourth Street and Main Street at 11:20 p. m. and holding cars on all lines for theater crowds we were

giving the best night service that could be expected in a city of this size. If the company felt that it could afford to run its cars an hour longer each night, or conditions were such as to demand this extended schedule, we should be glad to furnish the accommodations. We are anxious to furnish adequate service at all times and desire to be on the most friendly terms with the public, but the demand to run the cars on all lines until midnight every night is hardly justified by conditions, in our opinion."

Necessity for Enforcing Traffic Rules Urged in Worcester.—The chief of police of Worcester, Mass., has addressed a long communication to the captains under him in regard to the violation of the traffic rules of the city on the part of the drivers of heavily loaded vehicles. He urges the captains to impress patrolmen with the necessity of being constantly on the alert for violators of the traffic rules and says that patrolmen who fail to perform their full duty in this respect will be disciplined by the board of police commissioners. Commenting on the delay caused to street cars by drivers indifferent to the rights of others, the chief of police says: "Along the car tracks, especially on Grand Avenue, drivers of trucks and coal carts let their horses move slowly in the way of cars and automobiles, and make no endeavor to get out of the tracks, thereby obstructing and hindering travel, which is very annoying to people who are anxious to get to their places of business or possibly to the railroad station. Obstructing travel so that faster moving vehicles are unable to pass to the left is not only a violation of the city ordinance, but is also a violation of the state law, and any person can be prosecuted for committing such an offense."

Operating Changes of the Buffalo & Lake Erie Traction Company.—The Public Service Commission of the Second District of New York ordered the Buffalo & Lake Erie Traction Company to install an additional feeder from its substation at Athol Springs to the Blackwell Canal on the Hamburg Pike, the cables to be connected to the feeder system between the Ridge Road and Hamburg. The installation is required to be completed on or before Aug. 1, 1912. The company is also required to install facilities for turning its cars at Hamburg. After the installation at Hamburg is made the company will be required to turn cars at that point, and also at its terminus in Buffalo. In addition to the order made by the commission the company has accepted and is complying with recommendations made by the commission's inspector as to the installation of switches between Ridge Road and Hamburg, and is stopping all cars at certain points between Buffalo and Hamburg, cutting out twenty-four stops previously made, putting in a schedule on its Hamburg line based on a material reduction in running time between Hamburg and Buffalo, installing brakes, requiring conductors to announce passenger stops, and requiring the motormen and conductors to exchange signals at points on single-track portions of the Hamburg division.

Sale of Round-Trip Excursion Tickets Ordered.—The Public Service Commission of the Second District of New York has ordered the Schenectady Railway to sell return trip excursion tickets good until used between Schenectady and Stop 30 and also between Troy and Stop 30. The tickets are to be sold for not more than 25 cents each in at least one convenient place in Schenectady and one in Troy, and also at some convenient place in the vicinity of Stop 30. At present the residents of Stop 30 are obliged to pay 15 cents from any point in Zone 3, of which Stop 30 is practically the center, and claim that they are discriminated against because a round-trip ticket from any point in Zone 3 to Schenectady and to Troy and back again to the starting point in Zone 3 costs 55 cents if the trip is continuous, or 60 cents if two separate round trips, one to Schenectady and one to Troy, are made, and that is more than the regular price for the round-trip ticket between the two cities, which is 50 cents. It is the opinion of the commission that the 15-cent charge made to the regular travelers between Troy and Stop 30, and between Stop 30 and Schenectady, is unjust and unreasonable, and should be reduced, and the commission finds that the best way to do this is for the company to put on sale round-trip excursion tickets good from Stop 30 to Troy and from Stop 30 to Schenectady and return.

Personal Mention

Mr. Thomas D. Van Osten, who has been connected with the Savannah (Ga.) Electric Company for several years, has been appointed publicity manager of the company.

Mr. E. O. Edgerton has been appointed a member of the California State Public Utilities Commission by Governor Johnson. Mr. Edgerton was formerly a member of the Municipal Commission of Los Angeles.

Mr. W. H. Cogswell, formerly connected with the Pittsburgh sales office of the General Electric Company, has been appointed to supervise the contract department of the West Penn Railways, with headquarters in Pittsburgh.

Mr. Edgar A. Turpin has been made superintendent of transportation of the Indianapolis, Crawfordsville & Western Traction Company, Crawfordsville, Ind. Mr. Turpin has been a motorman on that road for several years.

Mr. Max Thelan, who has been attorney for the California Railroad Commission, has been appointed a member of the California State Public Utilities Commission by Governor Johnson. Mr. Thelan was graduated from the California State University. He studied law at Harvard and then served in the legal department of the Western Pacific Railway. He became attorney for the State Railroad Commission following Governor Johnson's election.

Mr. Henry Branson has resigned as superintendent of rolling stock and equipment of the Philadelphia (Pa.) Rapid Transit Company. Mr. Branson has been connected with the company for more than seventeen years. He was a carhouse foreman for six years, and for four years was in charge of the shops of the company at Fifth and Sixth Streets, Philadelphia. In December, 1909, he was appointed to succeed Mr. Fred H. Lincoln as assistant general manager of the company, with the title of superintendent of rolling stock and equipment.

Mr. John N. Spellman, who has been master mechanic of the Indianapolis, Crawfordsville & Western Traction Company, Crawfordsville, Ind., since 1908, has been made assistant general manager of that property, reporting to Mr. C. E. Morgan, general manager, who on April 1, 1912, becomes general superintendent of the Michigan United Traction Company, and also will retain his old position for the present. Mr. Spellman before becoming connected with the "Ben Hur Route" was master mechanic of the Indianapolis, Columbus & Southern Traction Company, and before that was in the mechanical departments of the Indiana Union Traction Company and the Eastern Wisconsin Railway & Light Company.

Mr. H. W. Scharf has resigned as assistant engineer in the motive power department of the New York (N. Y.) Railways, formerly the Metropolitan Street Railway. Mr. Scharf was graduated as an electrical engineer from Columbia University in 1901 and has been connected with the Metropolitan Street Railway continuously since that time. His first work was as assistant to Mr. W. A. Pearson, then electrical engineer, in the engineering department of the company. He engaged first in construction work and later was employed in laying out and superintending both new and reconstruction work in connection with power station and substation development. When Mr. Pearson resigned from the company in 1905 Mr. Scharf was appointed assistant engineer to Mr. M. G. Starrett, chief engineer and head of the engineering department, and in addition to his other duties Mr. Scharf had charge of the maintenance of electric power and substations, and he continued in that capacity when Mr. J. R. C. Armstrong became head of that department. Mr. Scharf's experience in the engineering department of the company covered the construction, maintenance and operation of power and substations, feeder distribution, etc., power and lighting in the carhouses, shops and offices and engineering work on cars, car equipment, etc.

Mr. C. E. Morgan has been appointed general superintendent of the Michigan United Traction Company, effective on April 1, 1912. He will have charge of traffic and transportation, rolling stock and track and roadway for all the interurban and city lines of the company. His office will be at Jackson, Mich., and he will report to Mr. J. F. Collins, vice-president of the company in charge of opera-

tion. Mr. Morgan has been manager of the Indianapolis, Crawfordsville & Western Traction Company for about four years. His first experience was of a clerical nature on a steam railroad. Then for five and one-half years he was assistant to the president, the purchasing agent and the auditor of the Indianapolis & Greenfield Electric Railway. During this period the line was extended to Richmond and the handling of the transportation service of the road, then about 60 miles long, came under his direction. In 1905 he had charge of the work of rebuilding and operating the Indianapolis & Martinsville line and was also superintendent of the Danville line of the Terre Haute, Indianapolis & Eastern Traction Company. Later, as superintendent, he inaugurated service on the Indianapolis & Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company and operated that division for two or three years. In 1909 he accepted the management of the Indianapolis, Crawfordsville & Western Traction Company, known as the "Ben Hur Route." This road was then in the hands of a receiver.

OBITUARY

John P. Martin, well known in the Central West as a promoter, died on March 13, 1912, at the Wilson Hospital, Xenia, Ohio. Among the enterprises which he was instrumental in promoting was the Springfield & Xenia Traction Company, which has been succeeded by the Springfield & Xenia Railway.

D. D. Dickey, general manager of the National Carbon Company, Cleveland, Ohio, died on March 8, 1912, as the result of an operation on March 5 for an internal trouble. Mr. Dickey was born at Pittsburgh, Pa., on Oct. 9, 1853, and was educated in the public schools at Pittsburgh and at the Western University of Pennsylvania. In 1883 he acquired an interest in the Pittsburgh Carbon Company, and he had a controlling interest in this company and its successor, the Faraday Carbon Company, until the consolidation of several companies into the National Carbon Company of New Jersey, in 1899, when he became a director and general manager of the consolidated companies.

William Jay Cooke, vice-president of the McGuire-Cummings Manufacturing Company, Chicago, Ill., died at his home in Oak Park, Ill., on March 20, 1912. Mr. Cooke was born in Cleveland, Ohio, in 1845, and moved to Chicago in 1885. For many years he was vice-president of the McGuire Manufacturing Company and its successor the McGuire-Cummings Manufacturing Company and cared for the selling interests of these corporations. His regular attendance for many years at electric railway conventions and his long acquaintance with the trade made him one of the best known men in the sales field. Mr. Cooke was a man of winning personality and striking appearance with his silver white hair, bright eyes and pleasant smile, and his urbane and genial manner on all occasions was a great factor in the popularity which he always enjoyed.

The Public Utlities Commission of Connecticut has denied the petition of the committee of the Common Council of Hartford for an order to require the Connecticut Company to erect a waiting station at the corner of Main Street and State Street, Hartford. The company questioned the authority of the commission to order the station, but the commission in denying the petition, expressed the opinion that "this commission has the power to order the erection and maintenance of such electric street railway waiting stations under certain conditions and in proper locations." The commission concluded its findings as follows: "There may be a question as to the authority of the commission to order or permit the Connecticut Company to erect a waiting station in the traveled portion of a public highway over which the company has a franchise right to lay its tracks and operate its cars, but the view taken by the commission on the advisability of issuing such an order in the case under consideration makes it unnecessary formally to pass upon this question. That a waiting station in the vicinity of City Hall Square would be a great convenience to suburban travel may easily be concluded from the evidence, but the location of such station in the highway as requested would not, in our opinion, work out satisfactorily or relieve the conditions complained of."

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Jemison Traction Company, Birmingham, Ala.**—Chartered in Alabama to build an electric railway in Birmingham. Capital stock, $5,000. Incorporators: A. L. Jemison, G. N. Smalridge and H. A. Burns.

***Alabama Traction, Light & Power Company, Ltd., Montgomery, Ala.**—Incorporated in Canada on Jan. 5, 1912, to acquire and operate hydroelectric power plants and to supply electricity for light, heat and power to Birmingham, Montgomery, Mobile and other important cities in Alabama, and to build and operate lighting and tramway systems generally. Capital stock, $30,000,000; of this amount $5,000,000 is 6 per cent cumulative preferred stock and $25,000,000 common stock. Directors: James Mitchell, Martin Littleton, John F. Wallace, James R. Morse, Lawrence Macfarline, W. D. Ross, Frank S. Washburn, J. S. Worthington and John Beaver White.

***White River Valley Railway, Barton, Ark.**—Chartered in Arkansas to build a 10-mile railway between Hugo and Webb. Capital stock, $20,000. Directors: W. H. Howe, O. D. Howe, J. C. Howe, W. L. Fernald and W. R. Satterfield

***Crossett, Monticello & Northern Railroad, Crossett, Ark.**—Incorporated in Arkansas to build a 48-mile interurban railway from Cremer Junction, 5 miles south of Crossett, to Fountain Hill, thence to Crossett. Capital stock, $300,000.

***Pine Bluff (Ark.) Company.**—Application for a charter has been made in Arkansas by this company as successor to the Citizens' Light & Transit Company. Capital stock, $1,200,000. Incorporators: Henry B. Stillman, Walter Haviland, Henry M. Haviland, Charles A. Lewis, Arthur N. Taylor, William B. White and Smith Weygant.

Havana Electric Railway & Power Company, Havana, Cuba.—Incorporated in New Jersey to take over the Havana Electric Railway and the Compañia de Gas y Electricidad de la Habana in Cuba. Capital stock, $30,000,000. Incorporators: Henry A. Bingham and Cornelius A. Cole, Jersey City, and Henry T. Letts.

***Indianapolis & Louisville Electric Railway, Indianapolis, Ind.**—Application for a charter has been made in Indiana by this company to take over the property of the Indianapolis & Louisville Traction Company sold under foreclosure for $750,000 to James C. Chapman, who represents the holders of the first-mortgage bonds. Capital stock, $1,200,000. Incorporators: James C. Chapman, vice-president of the Colonial Trust Company, Pittsburgh, Pa.; Nathan G. Eyster, Bethel B. Veech, Jerome Hill, Charles C. Tennis and William E. English.

Niobrara & Sioux City Railway, Pierre, S. D.—Application for a charter has been made in South Dakota to build an interurban railway from Niobrara, Neb., to Sioux City, Ia., with a branch to O'Neil, Neb. Capital stock, $1,000,000. Headquarters, Pierre, S. D. Incorporators: W. E. King, S. G. Peticolas, C. W. Baker, R. R. Kinkead, of Omaha, and Glenn W. Martens, Pierre.

Monongahela Traction Company, Fairmont, W. Va.—Incorporated in West Virginia as recorded in the Electric Railway Journal for March 23, 1912, page 479, to take over the property of the Fairmont & Clarksburg Traction Company, the Fairmont & Northern Traction Company and the Clarksburg & Western Electric Railway. There will be 90 miles of track in the consolidated company and the projected extensions will make 40 miles more. Capital stock authorized, $7,500,000. Bond issue authorized, $15,000,000. Officers: S. L. Watson, president; J. H. Wheelwright, vice-president; Walter Miller, secretary and treasurer; J. O. Watson, general manager; S. L. Watson, Clarence C. W. Watson, A. B. Fleming, C. L. Shaver, J. E. Watson, Walter Miller, George T. Watson and James O. Watson, Fairmont; S. C. Denham, Clarksburg; Van Lear Black and J. H. Wheelwright, Baltimore, directors.

FRANCHISES

***Tuscaloosa, Ala.**—The Tuscaloosa Ice & Light Company has asked the Council for a franchise to build a 2-mile electric railway in Tuscaloosa. Robert Jemison, Birmingham, president.

Fresno, Cal.—The Fresno Traction Company has received a fifty-year franchise from the Board of Supervisors upon certain streets in Fresno County.

San Francisco, Cal.—The United Railroads has purchased a twenty-five-year franchise from the property owners to build a line through the upper Sunset district of San Francisco.

Washington, D. C.—Authority has been asked of Congress by the Washington Railway & Electric Company for important extensions in the northeast section of Washington to connect the East Capitol and H Street Northeast lines by a loop on Fourteenth and Fifteenth Streets Northeast.

Daytona, Fla.—The East Florida Traction Company has received a franchise from the City Council in Daytona. A. A. Boggs is interested. [E. R. J., March 16, '12.]

Joliet, Ill.—The Chicago & Joliet Electric Railway has received a franchise to extend some of its lines in Joliet.

Evansville, Ind.—The Evansville, Henderson & Owensboro Traction Company has received a franchise from the municipal authorities in Evansville. This line will extend from Evansville, Ind., to Henderson, Ky., with a branch to Owensboro, via Zion, Hebbardsville, Curdsville and Sorgho. W. A. Carson, general manager. [E. R. J., March 2, '12.]

Muscatine, Ia.—The Federal Construction Company has received a franchise from the City Council in Muscatine to build a 10-mile electric railway and to construct an electric light and power plant upon the condition that the power used in the operation of the railway and power plant be secured through the development of the Moscow canal project. [E. R. J., March 2, '12.]

Baton Rouge, La.—The Baton Rouge Electric Company has asked the City Council for a franchise to extend its lines in Baton Rouge along Florida Street and down East Boulevard to South Baton Rouge.

Waltham, Mass.—The Boston & Western Electric Railway has received a franchise from the City Council in Waltham. The company has also been granted a franchise by the City Council in Marlboro. This line will extend between Waltham and Marlboro and the company has secured a right-of-way over private property for the entire distance. Work will be begun at once. [E. R. J., Jan. 13, '12.]

Faribault, Minn.—The Sioux Falls & Southern Minnesota Traction Company, Pierre, S. D., will ask the Council for a franchise in Faribault. The line will connect Albert Lea, Minn., and Sioux Falls, S. D. G. P. Peterson, Pierre, S. D., is interested. [E. R. J., Mar. 2, '12.]

St. Joseph, Mo.—The St. Joseph Electric Railroad has received a franchise from the Common Council in St. Joseph. J. G. Schneider, St. Joseph, is interested. [E. R. J., Dec. 16, '11.]

Kalispell, Mont.—The Flathead Interurban Railway has asked the City Council for a franchise in Kalispell. It will connect Kalispell, Whitefish, Somers and Big Fork. David R. McGinniss, Kalispell, president. [E. R. J., Feb. 17, '12.]

Kalispell, Mont.—The Whitefish & Polson Electric Railway, Kalispell, has asked the City Council for a franchise in Kalispell. The line will extend from Kalispell northward to Whitefish and southward through Somers to Polson on the west shore of the Flathead Lake. J. A. Edge, president. [E. R. J., Oct. 14, '12.]

Newark, N. J.—The Public Service Railway, Newark, will ask the Board of Freeholders of Essex and Hudson Counties for a franchise over the Clay Street bridge over the Passaic River, in East Newark.

Palatine, N. Y.—The Little Falls & Johnstown Electric Railway, Little Falls, has received a franchise from the Town Board of Palatine. [E. R. J., March 2, '12.]

Sharon, Pa.—The Mahoning & Shenango Railway & Light Company, New Castle, will ask the City Council for a franchise in Sharon to connect with the line in South Sharon.

Garland, Tex.—The City Council has voted a fifty-year franchise to the Eastern Texas Traction Company, which proposes to build an interurban railway between Dallas and Greenville and Greenville and Wolf City. J. B. Murphy, Greenville, general manager. [E. R. J., Feb. 17, '12.]

Ogden, Utah.—The Ogden Rapid Transit Company has received a franchise from the County Commissioners over the county roads in Ogden Canyon. The company has now secured the right-of-way for its 7-mile extension from Hermitage, the present terminus of the line, to Huntsville.

Salt Lake City, Utah.—The Saltair Railroad has received a franchise from the City Commissioners to operate an electric railway over certain streets in Salt Lake City.

Wenatchee, Wash.—The Wenatchee Valley Railway & Power Company has received a franchise from the City Council in Wenatchee. This is part of a plan to build an electric railway between Wenatchee and Leavenworth, via Cashmere. [E. R. J., Dec. 30, '11.]

TRACK AND ROADWAY

***Mobile, Ala.**—Surveys are being made for a right-of-way for a gas-electric railway between Fairhope, on the eastern shore of Mobile Bay, and Pensacola. The railway will be constructed by a syndicate of Northern capitalists, and a fast boat service will be inaugurated between Fairhope and Mobile in connection with this line. It is said that financial backing has been secured. C. L. Proctor, Athens, Ga., is said to be one of the promoters.

***Vancouver, Fraser Valley & Southern Railway, Vancouver, B. C.**—This company is applying to the Dominion government for an act extending the time within which the following lines may be built: From New Westminster to the international boundary near Douglas; from the southern end of the Fraser River bridge near New Westminster easterly to Chilliwack; from the south bank of the Fraser River westerly to Ladner's Landing. It is also desired to have power to enter into agreements with the British Columbia Electric Railway and its subsidiary, the Vancouver Power Company.

Pacific Electric Railway, Los Angeles, Cal.—Plans are being made by this company to extend its Eagle Rock line to Glendale, passing through La Canada, a distance of eight miles.

Monterey & Pacific Grove Railway, Monterey, Cal.—This company, which is a subsidiary of the United Railroads of San Francisco, has been notified that work will be begun at once on the railway between Salinas and Monterey. The new line, which will be electric, will connect Salinas Valley with Monterey, and it is supposed that it will be a part of a line which will extend from Monterey to San Francisco. It is reported that the United Railroads has also acquired the Pajaro Valley Railroad, a narrow-gage steam road, which runs between Salinas and Moss Landing. It is the intention to electrify this road and continue it north through Gilroy, San José and San Mateo and thus complete the line to San Francisco.

***Petaluma-Bloomfield Electric Railway, Petaluma, Cal.**—It is reported that $25,000, which is half of the bonus needed for the construction of the new electric railway north of Petaluma through the Two Rock and Bloomfield valleys, was subscribed at a meeting held recently.

Central California Traction Company, San Francisco, Cal.—This company will build a branch from Herald into Galt, a distance of 3 miles, if the people of the latter town will pledge the company sufficient business.

Northern Electric Railway, San Francisco, Cal.—This company has awarded a contract to Maney Brothers & Company, Hamilton, to build 27 miles of double track from Marysville to Colusa. This is the first of a number extensions planned by this company. One of the improvements contemplated is the construction of a new steel and concrete bridge over the Sacramento River at Meridian.

Augusta (Ga.) Railway & Electric Company.—A 1-mile extension will be built by this company from Augusta to Aumond.

Rome Railway & Light Company, Rome, Ga.—Plans are being made by this company to extend its line to East Rome.

Vincennes, Washington & Eastern Traction Company, Vincennes, Ind.—It is reported that work will be begun by this company about April 1 on its 33-mile electric railway between Vincennes, Washington and Loogootee. [E. R. J., Dec. 23, '11.]

Union Traction Company, Coffeyville, Kan.—Work will soon be begun by this company on its Cherryvale-Parsons extension. The contract for the line has not yet been let.

Covington, Big Bone & Carrollton Traction Company, Covington, Ky.—Work will be begun soon by this company on its 50-mile electric railway to connect Carrollton, Hamilton Landing, Big Bone Spring, Ghent, Vevay and Warsaw. The officers of the company are: M. J. Crouch, Union, president; Louis Fitz, Covington, vice-president; R. S. Holmes, Covington, treasurer, and J. J. Weaver, Covington, engineer. [E. R. J., Mar. 2, '12.]

Bangor Railway & Electric Company, Bangor, Maine.—This company has been asked to consider plans to extend its Hammond Street line in Bangor to Northern Maine Junction, a distance of between 3 and 4 miles.

Kansas City, Ozarks & Southern Railway, Ava, Mo.—Plans are being made by this company to build three new lines out of Ava, one to run to Rockbridge, the second to Hammond and the third to Bradleyville. Preliminary surveys have been made and the matter of securing the construction capital has not been settled. J. B. Quigley, Ava, chief engineer. [E. R. J., Oct. 31, '08.]

Ilion (N. Y.) Street Railway.—Preliminary surveys have been made and financial backing is being secured by this company to build a 3-mile electric railway in Ilion. J. H. Harrison, secretary of the Board of Trade, is interested. [E. R. J., March 9, '12.]

Sauquoit Valley Electric Railway, Utica, N. Y.—Preliminary surveys have been made and it is expected that construction will soon be begun by this company on its 7½-mile railway to connect New Hartford, Washington Mills, Chadwicks, Willowvale, Sauquoit and Claysville. The power plant will be located near Washington Mills. Albert P. Seaton, New Hartford, is interested. [E. R. J., Jan. 13, '12.]

Piedmont & Northern Railway, Charlotte, N. C.—Surveys are being made by this company for a new line out of Gastonia. U. S. Lee, Charlotte, chief engineer.

Northern Ohio Traction & Light Company, Akron, Ohio.—This company plans to double-track a portion of the line between Canton and Akron. It is said that the double-tracking in Canton will extend from Lake Junction to Reedurban and the other part of the double-tracking will be laid near Massillon.

Lake Erie & Youngstown Railway, Youngstown, Ohio.—Preliminary arrangements have been made and work will soon be begun by this company on its line from Youngstown to Conneaut, via Ashtabula, Trumbull and Mahoning Counties. John H. Ruhlman, Youngstown, promoter. [E. R. J., March 4, '12.]

Dominion Power & Transmission Company, Hamilton, Ont.—This company is securing options on a right-of-way from Hamilton to St. Catharines.

Midland (Ont.) Terminal Railway.—This company has secured an extension of time to complete its line. The name of the line was changed to the Midland Simcoe Railway. It will extend its line from near the harbor at Midland southeast through Tay and Medonte to the Grand Trunk Ralway line at or near Coldwater.

***North Bay, Ont.**—Town Solicitor McNamara is taking the necessary steps to apply for an electric railway charter for North Bay to connect with Callander, Trout Mills and Sturgeon Falls.

Blue Ridge Traction Company, Danielsville, Pa.—This company has awarded a contract to the Curtis & Shuway Company for the construction of an extension from Danielsville to Bath.

Philadelphia & West Chester Traction Company, Philadelphia, Pa.—This company is double-tracking its line near Milltown.

Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa.—This company has completed the double-tracking of its line to Bradford Station, about 12 miles north of Pittsburgh. At this point the company will develop a large tract of land.

Westmoreland County Railway, Pittsburgh, Pa.—This company has secured the right-of-way from the county line in and through Blairsville. Work will soon be begun on the line between Derry and Blairsville. The route over which the new line will run is from Derry to Millwood, thence to Hillside and Cokeville, across the Conemaugh River to Blairsville, along Morewood Avenue and various streets to the right-of-way of the Pennsylvania Railroad.

Regina (Sask.) Municipal Railway.—Appropriation has been made for an extension of this railway to cost $200,000..

***Florence, S. C.**—N. Gaillard Walker, Rock Hill, is reported to have made a proposition to the Florence Chamber of Commerce to build a street railway in Florence.

Chattanooga (Tenn.) Traction Company.—This company has received a franchise for operation in Chattanooga and has signed a contract with the Chattanooga Railway & Light Company for the use of its tracks. C. E. James, of the Chattanooga Traction Company, has announced that work toward the construction of lines to Nashville and Knoxville, Tenn., and Atlanta, Ga., will be taken up at once. The Noll Construction Company, Chattanooga, has been given the first contract, that for grading from Chattanooga to Signal Point, about 3 miles from Chattanooga. [E. R. J., March 9, '12.]

***Murfreesboro Electric Railway, Nashville, Tenn.**—This company has been organized to build an electric railway between Nashville and Woodbury, via Murfreesboro, Falls City, McMinnville and Short Mountain. Headquarters, Nashville. J. L. Parks is interested.

Nashville-Gallatin Interurban Railway, Nashville, Tenn.—This company has ordered 2500 tons of rails, the laying of which will begin May 15. It is stated that the interurban line between the two cities will be in operation by July 1. The grading has been completed and all of the concrete piers and culverts have been erected. Ties and poles have been secured and are ready for use. H. H. Mayberry, president. [E. R. J., Feb. 10, '12.]

***Rock Island, Tenn.**—The Great Falls Power Company, which is building a hydroelectric plant at Rock Island on Caney Fork River, is reported to be considering plans to construct an interurban railway which may connect Nashville, Guthrie and Clarksville, Tenn.

***Columbus, Tex.**—H. H. Montgomery, Dallas, is reported to have made survey concerning water power on the Colorado River with reference to plans for the construction of an electric railway to connect from Branham via Industry, New Ulm and Columbus, on the way to the Gulf Coast.

Texas Traction Company, Dallas, Tex.—Work has been begun by this company on its Hull Street extension in Denison.

***El Paso, Tex.**—It is said that Stone & Webster, Boston, Mass., will build an interurban line through the El Paso Valley if certain conditions are met.

Northern Texas Traction Company, Fort Worth, Tex.—Extensive improvements, which will include the double tracking of much of the line between Fort Worth and Handley will be made during the year by this company.

Virginia Railway & Power Company, Richmond, Va.—This company plans to build an extension to Deep Creek.

***Edmonds, Wash.**—C. T. Beeson is president and W. C. Bickford is engineer of an organization which plans to build an electric railway from Edmonds to Eighty-fifth Street, in the suburbs of Seattle, through Edmonds and on to Everett. Right-of-way is being secured.

Oregon & Southern Railway, Roseburg, Wash.—Contracts will be let at once by this company for the construction of its 63-mile electric railway to connect Medford, Grant's Pass, Roseburg, Ashland and Marshfield, Ore. Headquarters of the company are at Roseburg. J. Arnold Doyle, Medford, president. [E. R. J., Dec. 23, '11.]

Appalachian Power Company, Bluefields, W. Va.—This company will replace 2 miles of its track with 70-lb. rails.

Morgantown & Dunkard Valley Railroad, Morgantown, W. Va.—This company has completed its line between Cassville and Core, a distance of about 3 miles. It will construct at once the remainder of the line to Blacksville.

SHOPS AND BUILDINGS

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—This company has bought two acres of land in Indianapolis upon which it will build new carhouses and additions to its present carhouses. The tract is bounded by St. Calir, Oriental and North Streets and Highland Avenue. Work on the new buildings will begin this summer.

Des Moines (Ia.) City Railway.—Bids will be asked about April 1 by this company for the construction of a new carhouse in Des Moines. The structure will be one story, 211 ft. x 183 ft., and built of brick. [E. R. J., Feb. 10, '12.]

Public Service Corporation, Maysville, Ky.—This company has sold the old frame carhouse in Maysville and placed in service its new carhouse.

Schenectady (N. Y.) Railway.—A new office building and waiting room will be built by this company at 512 State Street in Schenectady.

London & Lake Erie Railway & Transportation Company, London, Ont.—This company has decided to erect new carhouses at St. Thomas, Ont., at a cost of $20,000, and will take under consideration immediately the question of using hydroelectric power.

Spokane & Inland Empire Railroad, Spokane, Wash.—This company has awarded the contract for the construction of its new store house to H. J. Skinner, Spokane.

POWER HOUSES AND SUBSTATIONS

Danbury & Bethel Street Railway, Danbury, Conn.—Extensive improvements are under way in this company's power plant at Danbury.

Jacksonville (Fla.) Electric Company.—This company has placed in operation its new power plant in Jacksonville, which has just been completed by the Stone & Webster Engineering Corporation.

Savannah (Ga.) Electric Company.—Work will soon be begun by this company on a new 11,000-kw power plant in Savannah.

Chicago, Ottawa & Peoria Railway, La Salle, Ill.—This company recently placed an order with the Ohio Brass Company for 5500 O. B. 35,000-volt insulators which will be used in rebuilding the transmission lines between La Salle and Princeton, Ill. This company is at present engaged in changing its transmission system and substation equipment over from 15,000 volts a. c. to 33,000 volts a. c.

Tri-City Railway & Light Company, Davenport, Ia.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for one 1000-kw motor-generator set, consisting of a two-phase, 4600-volt, 60-cycle motor and a 600-volt d. c. generator set, complete with direct-connected exciter and switchboard panels.

Southwestern Traction & Power Company, New Orleans, La.—This company has purchased a 200-kw generator from the General Electric Company.

Meridian (Miss.) Light & Railway Company.—Among the improvements planned by this company in the near future will be the installation of a 3,000-hp turbine in its power plant.

Ohio River Electric Railway & Power Company, Pomeroy, Ohio.—This company will install condensing apparatus in its power plant. It includes rectangular jet condenser for a 1500-kw and 2000-kw steam turbine, rotary dry air vacuum pump and a 100-hp centrifugal pump. Orders have been placed for this equipment.

Portland Railway, Light & Power Company, Portland, Ore.—Work will be begun soon by this company on its new machine shop and carhouse in Portland. The structure will be 205 ft. x 340 ft.

Dallas Southern Traction Company, Dallas, Tex.—This company has purchased three 435-kva, two-unit, three-bearing motor-generator sets and three 8-kw voltage exciters from the General Electric Company.

Northern Texas Traction Company, Fort Worth, Tex.—Among the improvements planned by this company during the year is the enlargement of its power house at Handley.

Appalachian Power Company, Bluefields, W. Va.—A new substation is being built by this company to be operated from the company's power plant in Virginia.

Manufactures and Supplies

ROLLING STOCK

Moose Jaw (Sask.) Street Railway expects to purchase five semi-convertible single-truck cars.

Cedar Rapids & Iowa City Railway, Cedar Rapids, Ia., expects to purchase a motor car and a trailer.

Corpus Christi Street & Interurban Railway, Corpus Christi, Tex., expects to purchase two closed cars.

Toronto (Ont.) Railway, it is reported, lost 160 cars in a fire which destroyed its East End carhouse on March 25.

Chatham, Wallaceburg & Lake Erie Railway, Chatham, Ont., will probably purchase one passenger car and several freight cars.

New York, New Haven & Hartford Railroad, New Haven, Conn., has ordered thirty-nine motor cars from the Standard Steel Car Company.

Public Service Railway, Newark, N. J., has ordered fifty additional air-brake equipments with CP-27 compressors from the General Electric Company.

International Railway, Buffalo, N. Y., has ordered 100 single-end straight-air-brake equipments with CP-27 compressors from the General Electric Company.

Suburban Railway, Chicago, Ill., has ordered twenty GE-206 quadruple-motor equipments and K-35 controllers from the General Electric Company, Schenectady, N. Y.

Bay State Street Railway, Boston, Mass., has ordered fifty GE-203 50-hp four-motor equipments with K-35 controllers and fifty straight-air-brake equipments from the General Electric Company.

Galveston-Houston Interurban Railway, Houston, Tex., has ordered four 53-ft. interurban trailer coaches from the St. Louis Car Company, through the Stone & Webster Engineering Corporation, Boston, Mass.

Southwestern Traction & Power Company, New Orleans, La., has ordered two GE-217 50-hp quadruple-motor equipments and two CP-29 straight-air-brake equipments from the General Electric Company.

Brooklyn (N. Y.) Rapid Transit Company is having an all-steel, center-entrance car built by the Standard Steel Car Company. The car is to be placed in service as an experiment. It is 45 ft. 6 in. long over all, 8 ft. 5 in. wide and seats fifty-eight passengers. The entrance is 14 in. above the rails. A detailed description of the car is printed on page 502 of this issue.

Washington Railway & Electric Company, Washington, D. C., has specified the following details for the fifty fourteen-bench Narragansett open-car bodies which are being built by The J. G. Brill Company:

Seating capacity	70	Underframe	wood
Length over vestibule	40 ft.	Bumpers	Brill angle iron
Width over sills	7 ft. 9¼ in.	Curtain material	Pantasote
Width over all	8 ft. 5½ in.	Gongs	Dedenda
Sill to trolley base	4 ft.	Headlights	Crouse-Hinds
Body	wood	Registers	Internat.
Interior trim, bronze and malleable iron		Sanders	Dumpit
		Seats	Brill slat
Roof	monitor deck	Seat material	cherry and ash

TRADE NOTES

Canadian General Electric Company, Peterborough, Ont., has called a meeting of the stockholders for April 25 to authorize an issue of $1,900,000 of new stock.

Green Fuel Economizer Company, Matteawan, N. Y., has recently completed the installation of hot-blast heating equipment in the plant of the Lee Tire & Rubber Company, Conshohocken, Pa.

Safety Armorite Company, Pittsburgh, Pa., has perfected a new type of conduit for use in the 100 specially designed cars now being assembled in the shops of the Omaha & Council Bluffs Street Railway.

Ackley Brake & Supply Company, New York, N. Y., has received a cable order for Ackley no-staff brakes from the Nancy (France) Tramway. Shipments of Ackley no-staff brakes were made this week to London, Paris, Berlin and Zurich.

Allis-Chalmers Company, Milwaukee, Wis., through a committee of bondholders, published on March 27 detailed plans of the reorganization of the company. Mention of the general terms of the plan was made in the Electric Railway Journal of March 23, 1912.

Electrose Manufacturing Company, Brooklyn, N. Y., has begun operating its new plant, located in the Robert Gair Building, Brooklyn. This plant, when fully completed, will be about 50 per cent larger than the company's former plant, which was destroyed by fire about three months ago.

American Conduit Manufacturing Company, Pittsburgh, Pa., is furnishing galvanite conduit for the 500 near-side cars being built by The J. G. Brill Company for the Philadelphia Rapid Transit Company, also for the fifty double-truck cars being built by the G. C. Kuhlman Car Company for the Detroit United Railway.

Pittsburgh Transformer Company, Pittsburgh, Pa., recently made a quick delivery of twelve 300-kva, 60-cycle, 22,000-2200-volt Pittsburgh transformers to the Wausau (Wis.) Street Railway. The order was placed with the stipulation that the manufacturing company should deliver the transformers within thirty days, under penalty of the forfeit of $50 per day for each day over thirty days, or with a bonus of the same amount for each day under thirty days. The order was completed in twenty-one days, and the company earned a bonus of $450.

Wonham, Sanger & Bates, New York, N. Y., have received orders recently for H-B lifeguards from the following companies: Forty guards for Reading Transit Company, twenty guards for Orange County Traction Company, twelve guards for Charleston Consolidated Railway, 102 guards for Brooklyn Rapid Transit Company, twenty-two guards for El Paso Electric Company, thirty guards for Edmonton Radial Railway and twenty guards for People's Railway, Wilmington, Del. Installations are also being made on the Fort William (Ont.) Tramways, Joliet & Southern Traction Company, Union Traction Company, Coffeyville (Kan.) Slate Belt Electric Street Railway, Keokuk Electric Company and the Carolina Traction Company.

Prepayment Car Sales Company, New York, N. Y., has recently received an order from the Capital Traction Company, Washington, D. C., for license and door and step apparatus for thirty pay-within cars. This equipment is to be used in covering the present old standard type semi-convertible cars operated by the company, which work when finished will give the Capital Traction Company a complete equipment of prepayment cars, consisting of 201 of the pay-within type and fifty-one of the pay-as-you-enter type. Boarding and alighting accidents on pay-within cars of the Capital Traction Company have been reduced 93½ per cent as compared with the old type car, reducing the cost of such accidents from $1.97 per thousand car miles to 13 cents, as shown in the article "Accidents on Prepayment and Other Cars in Washington," published in the Electric Railway Journal of March 2, 1912, page 357.

General Electric Company, Schenectady, N. Y., has received the following foreign orders: Twelve double-motor rheostatic brake equipments from the Allgemeine Electricitäts Gesellschaft, Thomson-Houston, Iberica, S. A., Madrid, Spain; one 200-kw synchronous motor-generator set and switchboard for the Mexico Tramways, Mexico City, Mexico; four 1000-kw, two-unit, two-bearing frequency-changer sets and one 75-kw direct-current two-unit, three-bearing generator set for the Tokio Railway, Japan; thirty-three 50-kw transformers, one 50-kw testing transformer, four induction regulators, five small motor-generator sets and two 200-kw voltage exciters for the Katsuragawa Hydro-Electric Power Company, Japan; forty-two direct-current motors from Workman, Clark & Company, Belfast, Ireland. The General Electric Company has purchased the manufacturing business of the Holophane Company and the Holophane Glass Company, which has plants in Newark, Ohio. Heretofore the General Electric Company has always sold the manufactures of these companies. A new department of the General Electric Company, to be known as the holophane department of the General Electric Company, has resulted from the purchase.

E. G. Long Company, New York, N. Y.—In the issue of March 9 of the Electric Railway Journal appeared a statement under the caption "Bemis Car Truck Company," in which Peckham trucks and repair parts for Peckham trucks were mentioned as being handled by the Bemis Car Truck Company. On May 23, 1910, the E. G. Long Company purchased, with the approval of the bankruptcy court, from Robert Wilkinson, trustee in bankruptcy of the New York Car & Truck Company, the business successor of the Peckham Manufacturing Company, the good will, patents, patent rights, records, stock, etc., connected with the Peckham system of street railway trucks and other supply parts, together with the Taylor brake, and all rights of the New York Car & Truck Company connected therewith. The E. G. Long Company states that it has made no arrangements with any other manufacturer to build Peckham trucks or to furnish repair parts for Peckham trucks now in service.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has received the following orders for railway motors: International Railway, Buffalo, N. Y., 100 double equipments of No. 306 motors and K-36G control; Phoenixville, Valley Forge & Strafford Electric Railway, two double equipments of No. 306 motors and K-36G controllers; Northern Ohio Traction & Light Company, Akron, Ohio, four quadruple equipments of No. 101-B-2 motors with K-28B control; Slate Belt Electric Railway, Pen Argyl, Pa., one quadruple equipment of 101-B motors and K-35G control; Orange County Traction Company, Newburgh, N. Y., four quadruple equipments of No. 101-B2 motors with K-28B control and five double equipments of No. 101-B2 motors with K-N control; Detroit (Mich.) United Railway, two quadruple equipments of No. 317-A motors and K-34-B controllers; Denver (Col.) City Tramway, two quadruple equipments of No. 306B motors with K-35G control; Memphis (Tenn.) Street Railway, double equipment of No. 101-B2 motors and K-10A control.

ADVERTISING LITERATURE

Bridgeport Brass Company, Bridgeport, Conn., is mailing a circular on phono-electric trolley wire.

T. C. White, St. Louis, Mo., has issued a booklet in which his improved porcelain strain insulator is described and illustrated.

Canton Culvert Company, Canton, Ohio, is mailing a folder which calls attention to the merits of Acme nestable corrugated metal culverts.

American Casting Company, Birmingham, Ala., has issued a 24-page catalog in which National cast-iron culvert pipe is described and illustrated.

Texas Company, New York, N. Y., prints in the March issue of *Lubrication* two articles entitled respectively "Oil Grooves and Bearings" and "Specifications."

Unit Construction Company, St. Louis, Mo., has issued a 16-page booklet in which the "Unit-Bilt" system of reinforced-concrete buildings is described and illustrated.

Pittsburgh Transformer Company, Pittsburgh, Pa., has reprinted in Bulletin No. 1158 an article by J. S. Jenks and W. H. Acker, entitled "Repairing High-Voltage Lines While in Service."

Electric Storage Battery Company, Philadelphia, Pa., has issued Bulletin No. 135, which describes and illustrates the installation of the chloride accumulator for signaling and interlocking as used in the new passenger terminal of the Chicago & Northwestern Railway, at Chicago, Ill.

Brown Hoisting Machinery Company, Cleveland, Ohio, has issued a 48-page catalog in which the different types of Brownhoist trolleys and electric hoists, which are used on its electric railways, are described and illustrated. Clearance tables and price lists are included in the catalog.

H. W. Johns-Manville Company, New York, N. Y., sole selling agents for I. P. Frink, designer and manufacturer of lighting specialties, has issued Catalog No. 408 on modern illumination for insurance companies and banks. The company has also issued Catalog No. 406 for 1912, which lists and illustrates "Noark" inclosed fuses and fuse accessories. The more important improvements made during the past few years in these devices are described and illustrated. The catalog contains 332 pages and is bound in cloth.